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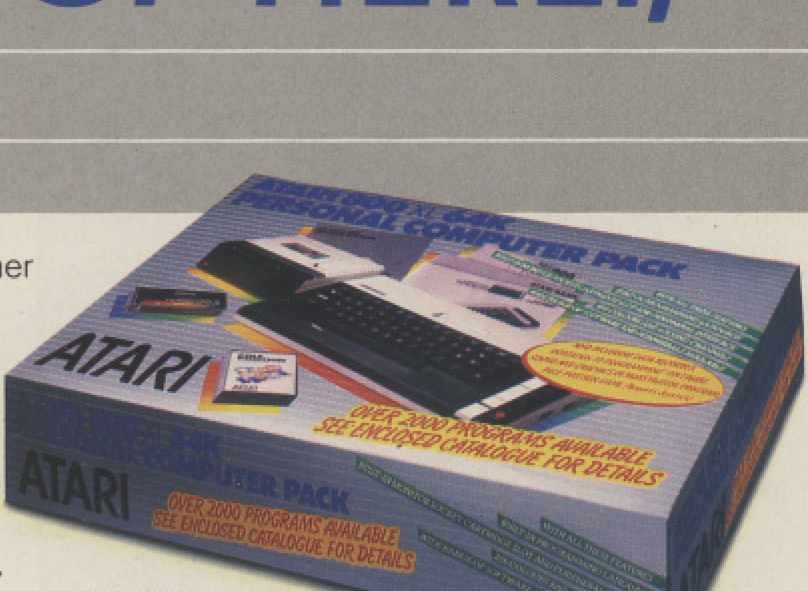
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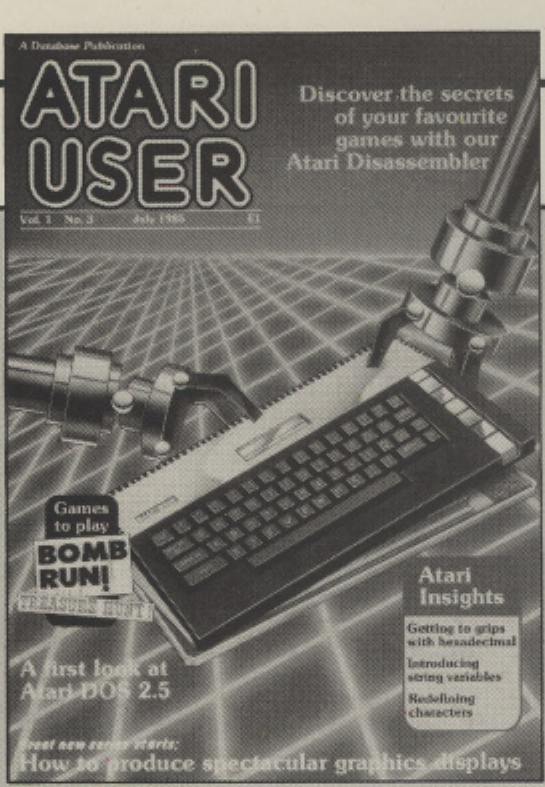
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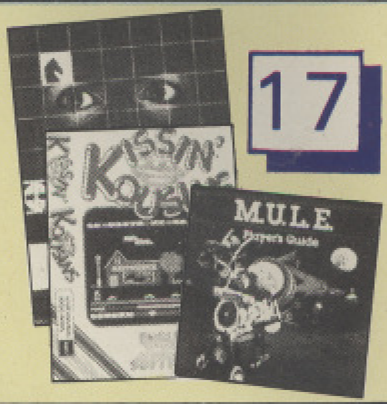
News
All the latest in Atari news. The demise of the 130ST, the ST software promise, and lots more. **7**

Beginners
Mike Bibby continues his series with a look at strings and string variables – knotty stuff. **10**



Adventuring
Brillig takes a trip to the Emerald Isle and solves a Murder on the Zinderneuf. There's an answer to the Filthy Fifteen and a new brain-bender to keep you busy. **14**

Software
This month our intrepid reviewers keep their brains busy with MULE and Pensate and their joysticks busy with Hard Hat Mack, Bounty Bob Strikes Back and Kissin' Kousins. **17**



Graphics
Dave Russell gets rid of unwanted hearts in Modes 1 and 2. **20**

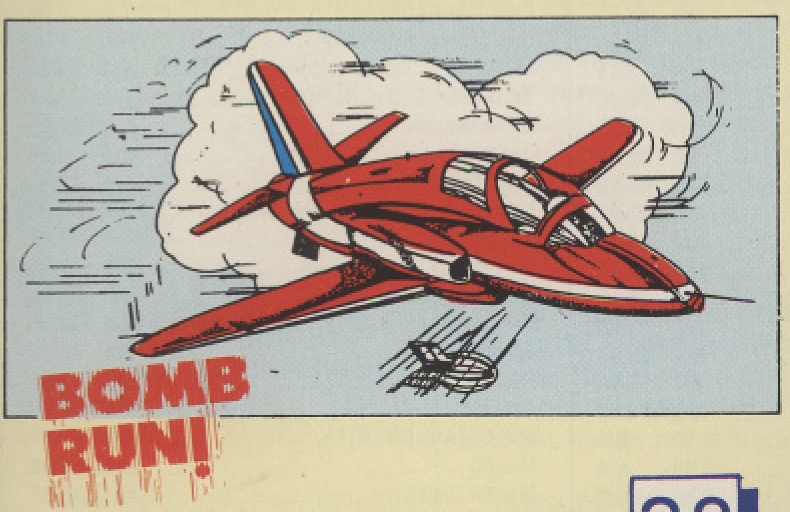
Display Lists
The start of a new series in which Mike Rowe explains how to produce spectacular graphics. **24**



Contents

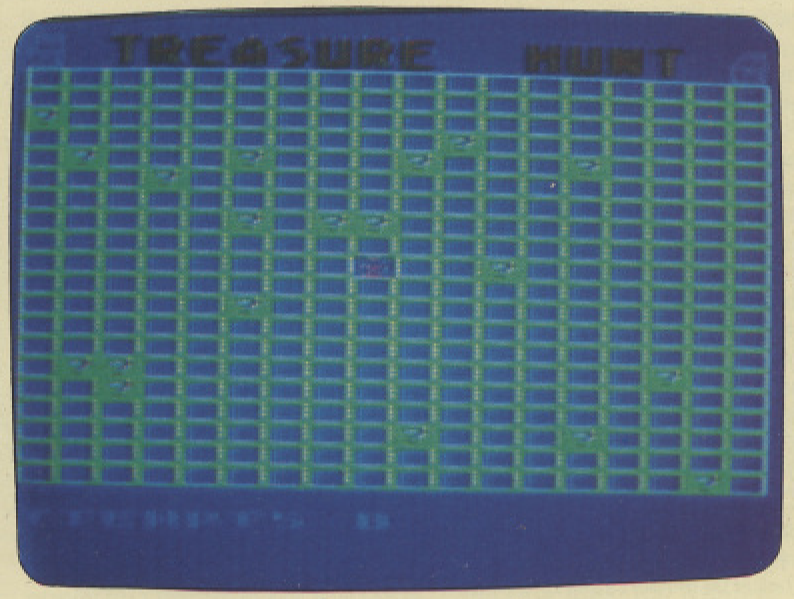
Disassembler 28
If you want to see what's happening deep inside your Atari, Kevin Edwards' disassembler will show you.

Utility 44
Speed up the Atari's power function with Frank O'Dwyer's routines.



A golden oldie from the fertile pen of Roland Waddilove. Go into action with trigger-happy race against time. 32

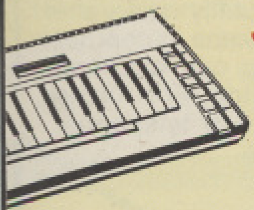
Bit Wise 46
Mike Bibby takes the mystery out of nybbles and bytes.



TREASURE HUNT! 48
Find the treasure but avoid the bombs in Mike Rowe's game. You'll need a bit of logic and a bit of luck as well.



17 Commandments 36
If you're thinking of writing for Atari User, you'll need to read this.



Sounds 38
Convert your Qwerty keyboard into a simple organ keyboard with this easy-to-enter routine.

Mailbag 57
Enter your name here by writing to us with all your questions, answers and general comments.

DOS 39
Atari's new DOS 2.5 gets the thumbs up from André Willey.

Microscope 42
Take a close look at this password generator – then use it to beat the hackers.

Order Form 60
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Atari kills off the 130 ST



"We will definitely be bringing out a machine priced between £400 and £500" – Atari sales and marketing chief Rob Harding.

Replacement will be more sophisticated

THE 130ST is dead. Atari has confirmed that its eagerly-awaited medium price personal computer will not be manufactured after all.

But there IS to be an ST-based machine in the same £400 to £500 range, and it WILL be available in the autumn.

"It's true we have scrapped the 130ST", sales and marketing boss Rob Harding told *Atari User,* but we regard this as a positive move, not a backward one.

"Quite frankly, the 130ST as originally planned – a naked CPU with 128k RAM – would not have been sufficiently superior to other machines in its price range.

"Jack Tramiel's philosophy is 'power without the price' which has been achieved with the 520ST – but the 130ST would have fallen short of this high standard so it had to go.

"But we will definitely be bringing out a machine – priced between £400 and £500.

"It will be ST-based, but a much more sophisticated product than the 130ST, with more memory and possibly even a disc drive.

"I'm confident we'll have supplies ready in the autumn to take on the QL and the new BBC B+".

News of the new machine brought a delighted response from recently-appointed Atari official distributor, Silica Shop.

"We went to the Hanover Show to see the 130ST and were very disappointed at its absence", said a spokesman.

"The decision to scrap this model was a further blow. But we are delighted to hear it will be replaced by something even better.

Rethink

"I think this will be the right machine for the market, a powerful computer for the price you could normally only buy a Commodore and disc drive".

The new machine could bring about a rethink by distibutors who have backed away from recent deals offered by Atari because of margins and stocking commitments.

Major distributors Terry Blood and Lightning were unhappy about the non-appearance of the 130ST, which they saw as a key element in marketing the range.

Joe Woods, marketing manager of TBD, has said: "The 520ST is too expensive for us to take in the quantities Atari wanted".

A more sophisticated version of the 130ST in the same price bracket could make the Atari range look attractive once again. But both TBD and Lightning would still seek less rigid distribution deals.

Lightning spokesman Tom Ferguson told *Atari User:* "We're willing to open new negotiations for existing stock or new products, but only if the terms are different regarding stocking commitments".

A TBD spokesman added: "If Atari asks for the same level of commitment for this new machine as for the 520ST our position is likely to be the same – no deal".

BACK TO JACK

THE move by Commodore executives to switch to Atari is not restricted to the United States.

Alvin Stumpf has recently swapped the post of heading up Commodore in Germany for a similar position with Atari there.

He follows a number of Commodore executives in the United States who have changed horses.

"This is not a question of predatory hiring or any problems Commodore may have been currently having", Max Bambridge, Atari's European sales and marketing head told *Atari User.*

"I believe it is all very logical in that once people have worked for a winner like Jack Tramiel, they would want to go out of their way to work for him again".

Silica Shop takes over

STEPPING in where others fear to tread is ... Silica Shop.

It has agreed to become the official distributor for Atari following the disappearance from the scene of Terry Blood and Lightning.

The latter blamed their departure on Atari's requirements for high stock commitment – orders having to start at £250,000 – when they claimed the market did not support it.

Silica Shop's Tony Deane, however, said his firm did not have any qualms in accepting this commitment.

Since it began dealing with Atari in 1979, Silica had never had problems in placing large orders consistently, he said.

Expertise

"Unlike other distributors, Silica Shop only deals with one manufacturer, so all the funds we have, all the experise, can be generated into that one area", he explained.

Distributors who deal with a number of makes and can only put a percentage of their funds into each one would find it difficult to make a similar commitment, Deane continued.

Commenting on the Atari deal, he said: "We are very happy with their terms. They give very good support and keep their promises. They said they would launch the ST and did so a month ahead of schedule. That I like".

The company also liked Jack Tramiel's pricing policy and his news of a planned ST model in the £400-£500 range, to replace the dropped 130ST, and which would be more sophisticated.

Deane said: "The Atari range is unbeatable, its quality superb, and the price is now right. Jack's got everything going for him".

● Asked at the Comdex Show in Atlanta how he was going to finance the proposed production of the ST computers, Jack Tramiel, as bluntly as usual, replied: "From my own pocket".

The Tramiels ...waiting for breakthrough

THE fate of Atari hangs on whether or not the new ST machines achieve a market breakthrough, according to the well informed USA based Fortune magazine.

"If ST's start selling Tramiel's low prices mean trouble for Apple and IBM – and anybody else with home computer plans", writes associate editor Peter Petre.

But he goes on to warn: "If they don't, Atari could be fighting to the death against Commodore".

Author Petre takes a long hard look at Atari since Tramiel took over. From this he concludes that the battling businessman wants to turn the corporation into a family stronghold to be passed on to his three sons.

Sam Tramiel, now the Atari president, had previously worked for his father when he was the boss of Commodore. He then went on to prove himself in his own right out in the Far East.

The Fortune article suggests that Tramiel's younger sons are currently assigned to "journeyman positions" in Atari because of their lack of experience.

Leonard, 30, who holds a PhD in astrophysics, is helping to create software for the ST machines while Gary, 25, who previously worked as a stockbroker now "handles odd jobs" in Atari's financial set up.

The magazine claims that when Tramiel bought Atari it was distressed merchandise, and so made to order for him.

Atari had lost $539 million in 1983 after the video bubble burst. This is said to have placed pressure on Warner Communications – under whose wing the company came at that time – to offload with Atari "hemorrhaging cash".

Fortune reports that the deal with Tramiel took shape during a "frenetic week".

Petre writes: "The sale of assets agreement was a 300 page monument to expediency, full of qualifications, loopholes and doors left open to be closed later.

"Tramiel paid no cash. He got the assets in exchange for long term debt and warrants that give Warner claim to 32 per cent of Atari's stock".

According to Fortune, the new look Atari is already claiming to be operating at a profit.

"That's not implausible", writes Petre, "although the company got most of its $125 million in revenues during the last half by unloading bloated inventories at cut rates".

Still the writer points out that Atari is currently facing enormous risks.

One of these, he claims, is that the XE from which the corporation hopes to draw a substantial amount of revenue could face problems.

"The cooling of the home computer fad could mean that the XE may already have been passed by", he warns.



The Tramiels – Chairman Jack, 56, with, clockwise from lower left, President Sam 35, Gary, 25 and Leonard, 30.

Software set up is sorted out

LEADING UK software houses have been briefed on Atari's requirements and plans over the next few months by the company's software director, Sig Hartmann.

Hartmann admitted that shortage of software has been a problem for Atari in the past. "But that's not going to be the way in the future", he promised.

"Under Jack Tramiel's leadership we're a much more aggressive company, and we intend to see that we have the software support right across the market for our new product range".

Following the company's showing at the American Consumer Electronics Show, the major US software houses realised that producing for Atari was going to provide a winner for them.

"We think you'll agree when the products are unveiled in Europe", Hartmann told the British software publishers. "We see the new Atari systems as being centres of home activity.

"Sure, there'll still be room for games, but much more emphasis is being paid to serious uses such as home accounts and word processing".

Hartmann gave an indication of Atari's philosophy when questioned about the future of cassette program recorders.

"They're going to become things of the past", he forecast, "the whole market is shifting into disc drives. Prices have to come down".

£750 for the 520 ST?

ATARI has denied reports in the trade press that it intends to sell the 520ST in three different packages.

A company spokesman told *Atari User:* "The machine will be sold in only one configuration.

"This will include 12in high resolution mono screen, the 520ST with mouse, $3\frac{1}{2}$in 500k disc drive and bundled software consisting of Basic, Logo, GemWrite, GemPaint, TOS operating system and BOS business operating system".

At press time Atari was hinting at a price in the £700 to £800 range for this package.

"In fact if you said it was going to cost £749.99 you would probably be accurate", said the spokesman.

520 ST turns up – in a trickle

THE first major batches of Atari 520STs have begun arriving in Britain.

But prospective purchasers are advised to be very patient. It could be autumn before they are able to walk into a shop and buy one off the shelf.

"I'm afraid the machines will be in short supply for a while yet", said a company spokesman.

"The 520STs are arriving in the hundreds rather than the thousands and we have a large backlog of orders from systems houses, educational establishments and the like that have to be filled as a priority".

On a brighter note, there should be no shortage of software when the machines become freely available.

More than 50 software houses have already bought development systems and are expecting to have finished or nearly finished products by the beginning of September.

By that time more than 100 – perhaps as many as 200 – software houses are expected to be working on programs for the 520ST ranging from games to specialised business packages.

50 packs promised

AN announcement that more than 50 ST software packages would be released by July 8 was made by Atari's vice-president Sigmund Hartmann at the recent Comdex Show in Atlanta.

To be included in that number was a Lotus 123 superset, he said.

And when those gathered at the press conference complained about Atari's poor press packs, he ended: "There are times to have caviar. There are times to have beans. This is our time for eating beans – but we plan to eat caviar when our time comes".

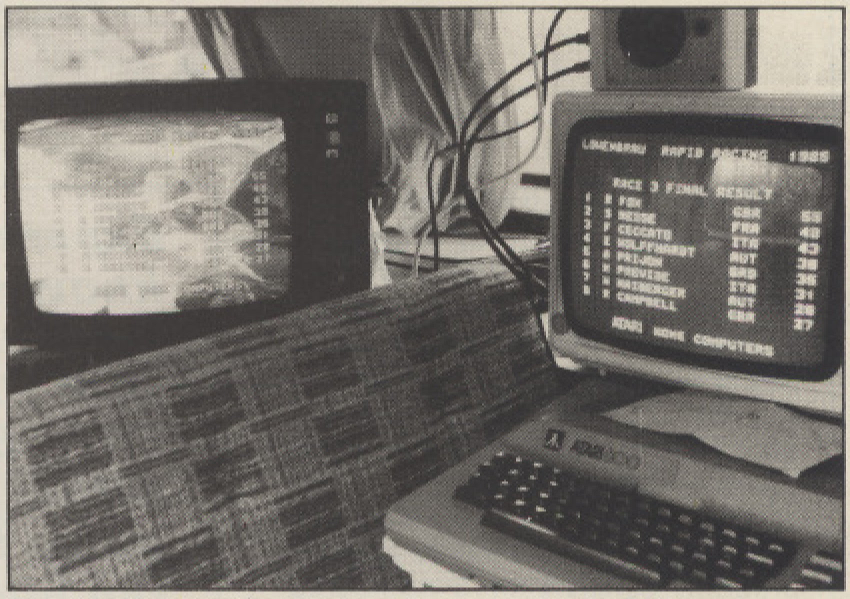
Canoe champions rely on an Atari

ATARI users watching the Rapid Racing canoeing on ITV's World of Sport recently may have noticed their favourite computer getting a lot of credit during the various score readouts.

In fact Atari regularly plays an important role at the annual championships held on the white water at Bala, North Wales.

The event attracts the world's top canoeists from all disciplines to compete against each other over four different races in four days.

The occasion is covered by a big TV crew which depends on an Atari for accurate results data processing and most of the score displays and lists of competitors that appear as overlays on the television screen.



The Atari's output is used as an overlay by the TV team

Sophisticated

This work is done on an "old" Atari 800 with an 810 disc drive, high speed printer, 850 I/O box, three monitors, a sophisticated computer/TV interface adapter, and various other "boxes of tricks".

All of these are arranged in a mobile caravanette and operated in conjunction with the timing computers by a two-man team.

The 20k machine code program was written for Atari by Archer MacLean, author of DropZone among others, and is a cleverly thought out menu-driven system allowing a non-technically minded person to operate it.

It gives the user instant access to and from a wide variety of functions and can cater for up to 64 named and numbered competitors in four independent sets of race results, allowing both mid point and finish times.

At any time results can be quickly printed or displayed on demand in a wide variety of presentation styles and can be based on points or times for any race or all four races combined.

The operator can also edit and rearrange screens before display so that special messages can be generated as requested by the TV director.

Says MacLean: "The Atari equipment used is five years old now and is probably one of the most travelled systems in use.

"It performed as faultlessly as ever last time out, despite being used in a very damp atmosphere at some very awkward-to-reach riverside locations.

"In fact it only failed once – when the generator ran out of petrol!"

CUT PRICE GAMES OFFER ENDS

A MYSTERIOUS mail order operation offering top selling games at rock bottom prices has apparently stopped, just as leading software publishers were urgently investigating its activities.

Money has been returned to people who ordered software packs from A1 Software Services of Hornchurch, Essex.

Famous titles like Pole Position, Ghostbusters and Jet Boot Jack were mentioned in the promotion which offered the general public as many as 50 games for £30.

One software publisher who sent a postal order for £19 to A1 Software Services for a pack of 15 games had his money returned along with a slip of paper saying "A1 Software Services has ceased trading".

"I shall be pleased if this mail order operation has stopped", he said. "I was most concerned that our titles had been mentioned in it and our legal department was ready to act should any infringement of copyright have been involved".

String along... and pick up some

WE saw last month how to write our own programs, however primitive. Now we'll look at some ways of improving them. I don't guarantee that you'll be able to produce spectacular programs by the end of this article, but you will certainly be well on the way to an understanding of Basic.

Expand your knowledge of programming with PART THREE of MIKE BIBBY's guide through the micro jungle

First, though, let's recap a little: We saw last month that a Basic program consists of a numbered sequence of instructions to the computer.

To enter one of these instructions we simply type the correct line number, followed by the appropriate Basic keyword, then press Return.

As we discovered, because of the line number, the Atari doesn't do what you tell it immediately, but remembers it as part of the program.

To see all the instructions in a program, we type:

LIST [Return]

To actually get the Atari to carry out the sequence of instructions we type:

RUN [Return]

To clear a program from memory (and we should do this before entering a new program), we use:

NEW [Return]

We saw that we tended to enter line numbers in steps of 10 to allow us to fit in other instructions between them if necessary. Also we found that we could replace a line with a better version by simply giving the new version the line number of the old one.

```
10 PRINT "PROGRAMMING"
20 PRINT "IS"
30 PRINT "EASY"
```

Program I

Finally, to delete a line completely, we simply type the line number and press Return.

Program I is the one we started with last month. Before we continue, type it in and run it, to make sure you know what's going on.

Program II is another way of

```
10 DIM A$(12),B$(12),C$(12)
20 A$="PROGRAMMING"
30 B$="IS"
40 C$="EASY"
50 PRINT A$
60 PRINT B$
70 PRINT C$
```

Program II

achieving exactly the same output. Type it in and try it.

Apart from it being an incredibly long-winded way of doing things, what else is going on?

Well, as you will recall from the first article in the series, the words inside quotes are known as strings – because the computer simply remembers them as strings of letters. That is, it considers HAMSTER as H, followed by A, followed by M and so on, with no idea of the word's meaning.

I don't think that it takes all that much imagination to see that when your computer is printing a lot of output, you might be using the same string rather a lot.

For example, in a business letter you might use the name of the company fairly frequently – for instance, BBC for British Broadcasting Corporation. Atari Basic allows us to use much the same idea, but more as labels than abbreviations.

For instance, in line 20 of the above program we have labelled the string "PROGRAMMING" with the label A$.

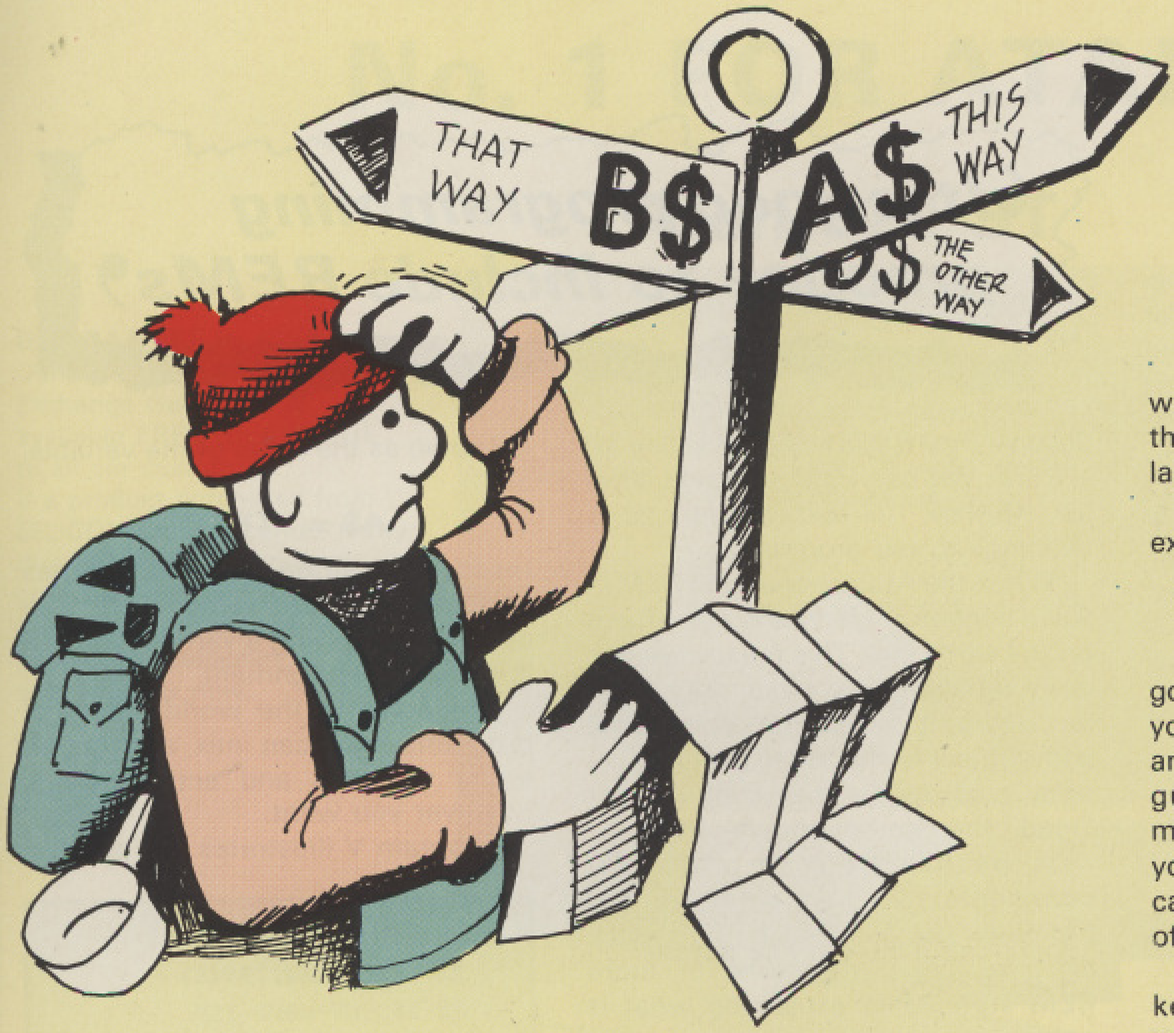
In computer terms, we have assigned to A$ the value "PROGRAMMING".

All this means is that from now on wherever I want to use "PROGRAMMING" in my program, I can replace it with A$. So line 50, which is:

50 PRINT A$

causes the micro to print out "PROGRAMMING".

Admittedly in this example this technique of labelling doesn't save



handy jargon

much space or effort, but if the program uses the word "PROGRAMMING" 100 times, there would be a substantial saving in using A$ instead of the string itself.

Similarly, line 30 causes B$ to label IS and line 40 labels EASY with C$, so that lines 60 and 70 give the appropriate printout.

Notice the following points:

- We have chosen our labels so that they consist of a letter of the alphabet followed by the $ sign. Actually, we don't have to restrict ourselves to just one letter, as we shall see, but our label must end with the $ sign, since this warns the computer that we are labelling a string. And the letter we use must be a capital. (We'll see later how to label other things.)
- While I used A$ for the first label, B$ for the second and C$ for the third, this was totally arbitrary on my part – labels don't have to follow alphabetic or any other kind of order.
- Although we use an equals sign (=) to connect the label with what it is labelling, it is safer, as we shall see, not to think of it as an equals sign – think in terms of A$ becomes "PROGRAMMING" rather than A$ equals "PROGRAMMING".
- We must have the label on the left and what is labelled on the right of the equals sign. A line such as:

20 "PROGRAMMING" = A$

just does not make sense to the Atari. Try it for yourself!

- When labelling we put the string inside quotes, as we did previously when using the PRINT statement to print out strings. So line 20 reads:

20 A$ = "PROGRAMMING"

From now on A$ completely replaces "PROGRAMMING", quotes and all, so that when we say

PRINT A$

we don't have to use any quotes – they're already there, implicit in the label A$.

All right, but we still haven't explained line 10:

10 DIM A$(12),B$(12),C$(12)

Well, it's all to do with the micro's good housekeeping. Just as, when you throw a party, it's helpful to have an idea of the maximum number of guests you expect, so it's only manners to tell the Atari how large you think each string is going to be. It can then set aside a suitable amount of memory for the strings.

We do this with DIM – a new Basic keyword that fixes the maximum number of letters or characters to be associated with each label.

For instance, if we had a string label X$ and we never wanted it to refer to a string of more than ten characters in length we would have a line such as:

10 DIM X$(10)

Notice:

- The keyword DIM followed by a space.
- The label X$ followed directly – no space – by the maximum length you want to label, in brackets.

That's what we did in line 10 of Program II. This time we had three labels to dimension – A$, B$, C$ – so we put them all in the same line, separated by commas.

You might also notice that I've been pretty wasteful with my dimming, as it's known – I've given each label a maximum length of 12, although, as you'll see from the rest of the program, none of my strings is that long.

I could have got away with:

10 DIM A$(11),B$(2),C$(4)

Try running Program II with this

> *'It is good programming practice to include REMs'*

new line, if you don't believe me. Remember, all you have to do to alter a line is to retype it (starting with the line number of course), then press Return. The new version of the line will replace the old one.

What would happen if we didn't DIM enough room for a string being labelled? Try replacing line 10 with:

10 DIM A$(8),B$(2),C$(4)

If you've done it properly, when you run it you should get the message:

PROGRAMM
IS
EASY

As you can see, the label A$ accepted as little as possible.

All right, but you wouldn't make this sort of mistake, would you? After all you can just look at a program and see how big the strings you're labelling are going to get.

Yes, but the strings you're labelling can change size as in Program III,

```
10 DIM X$(7)
20 X$="BIG "
30 PRINT X$
40 X$="BIGGER"
50 PRINT X$
60 X$="BIGGEST"
70 PRINT X$
```

Program III

where what X$ labels varies from BIG via BIGGER to BIGGEST. Hence another, more common name for these string labels – string variables.

Notice each time you give a string label or variable a value, that value "replaces" the old value. These variables really vary.

Now when we label a string the label refers to whatever is inside the quotes, including spaces, as you will see if you run Program IV.

Notice that our punctuation – semicolons – works for labelled strings just as it worked on its own.

Notice also that we have introduced a new Basic keyword in line 10 – REM. We use REM which is short for REMark, to add comments or headings to our programs.

When the Atari encounters REM in a line it ignores everything else after it on the same line. This means we can write whatever we want after REM (providing it is on the same line) without fear of the micro giving us an error message – the Atari doesn't "read" the line beyond the REM.

If we use REM to prefix our comments, we can annotate our program. Certainly each main subdivision should have one or more REM statements explaining what is going on.

Since the Atari ignores the contents of REM statements, you could leave them out of your program entirely and it will work as effectively. However it is good programming practice to include them.

In Program IV I have used a single REM at the beginning of the program, as it is so short. Bear in mind however, that REM can appear on any line in a program.

Now for some jargon. From now on we shall refer to our labels as variables. Don't be put off by the mathematical sound of that – they are still just labels. And instead of saying we are labelling, we say we are assigning, as we have mentioned previously. The actual string involved

```
10 REM PROGRAM IV
20 DIM A$(7),B$(7),C$(7),D$(7)
30 A$="TEST"
40 B$=" TEST"
50 C$="  TEST"
60 D$="   TEST"
70 PRINT A$;B$;C$;D$
80 PRINT "0123456789012345678901234567
89"
```

Program IV

is known as the value of the variable. So:

A$ = "TEST"

reads "the string variable A$ has assigned to it the value TEST. The actual act of giving a variable a value is called an assignment.

To return to the world of actual programs, you can mix and match string variables and actual strings however you want.

Program V illustrates the point:

```
10 REM PROGRAM V
20 DIM A$(10),B$(5)
30 A$="MY NAME IS"
40 B$=" MIKE"
50 PRINT A$;B$
60 PRINT "MY NAME IS";B$
70 PRINT A$;" MIKE"
```

Program V

Notice the space at the beginning of the string assigned to B$ – you need this otherwise the output looks rather odd. Leave it out if you don't believe me.

As we saw last month, a semi-colon at the end of a line causes the next output to start immediately after the last and not on a new line – as it would do in the absence of the semi-colon. That is, it "glues" the strings together.

The internal semi-colons of lines 50, 60 and 70 do much of the same, "gluing" variables to strings, and so on.

Also, on the subject of grammatical propriety, when we're assigning variables we should use the LET statement. So line 40 should read:

40 LET B$ = "MIKE"

As you've already discovered, we can omit LET altogether.

● *Next month, more on variables and INPUT – which opens the door to effective programming.*



ATARI
SC1224

A map's a must in these sprawlin brawling Level 9 a

says Brillig

FOR those of you who have been reading this section of *Atari User* every month, it may seem that virtually all adventure games are written by the American race. Adventure International and Infocom have dominated my examination of the origins and the different types of adventures available.

There are, however, plenty of good adventure writers from these fair shores, and the recent release of Emerald Isle by Level 9 gives an ideal opportunity to examine one of the best known of them.

Emerald Isle is the seventh adventure released by Level 9 for the Atari and is text only, although other machines which the firm covers now receive the graphics treatment.

In the next few months we shall visit all seven, but for the moment I will concentrate on the first and the last, to give an idea of what immersing yourself in a Level 9 game is like.

The golden rule in adventuring is to make a map, so that no matter how perplexing your surroundings you can always find your way around. This is never truer than when playing a Level 9 game, as their speciality is in big sprawling games.

To give you an idea of what this means their first release was an adaptation of Colossal Cave, the grand-daddy of all adventures, faithfully programmed from the mainframe original down to home micros by using a sophisticated text compression technique known as the A-Code.

This coding allowed the Austin brothers, Pete and Mike, to reproduce the game despite the limitations of memory of home micros at that time. Not content with this, they then proceeded to add a further 70 locations of their own as an endgame, making their version the most original of the many copies of Colossal Cave on the market.

So, putting the earliest and most

Quasimodo leaves a tunefu

HIGH in the church tower, Quasimodo, deafened from years of playing footbell (think about it), is a bit miffed because the local parishioners keep telling him the bells . . . the bells . . . are out of tune.

This of course is completely untrue and to get his own back he has cut all the seven ropes and left them in a complete tangle on the vestry floor.

The people have commissioned the BBC (Belfry Builders' Club) to sort out the mess and they in their infinite wisdom have picked you, one of their best men, to do the job.

All you have to do is identify which rope is which down in the vestry and then pull them in the right order. The only commands you need are U (Up), D (Down), T (Tie), and P (Pull).

Despite what you may assume after hours of puzzling, the problem has a solution. The best of luck – you're going to need it!

```
1 REM QUASIMODO
2 PRINT CHR$(125)
5 DIM A(10),B(10),U(10),D(10),V$(10),D
$(10)
20 M=0
30 B=0
40 N=7
50 FOR I=1 TO N:A(I)=0:NEXT I
60 FOR I=1 TO N
70 E=INT(RND(1)*N)+1
80 IF A(E)>0 THEN 70
90 A(E)=I
100 B(I)=E
110 NEXT I
120 GOTO 270
130 PRINT "You can't do that"
140 PRINT "What now ";:INPUT V$
150 V$=V$(1,1)
160 IF V$<>"D" THEN 250
170 IF F=0 THEN 130
180 M=M+1
185 IF M=3 THEN PRINT "Quasimodo ties
the ";N;" ropes to the ";N;" bells"
190 PRINT "You are in the vestry.":PRI
NT N;" ropes hang from the ceiling"
200 F=0
210 FOR I=1 TO N
220 D(I)=0
230 NEXT I
240 GOTO 140
250 IF V$<>"U" THEN 330
260 IF F=1 OR M=3 THEN 130
265 M=M+1
270 PRINT "You are in the belfry.":PRI
NT N;" ropes lie on the floor"
280 F=1
290 FOR I=1 TO N
300 U(I)=0
310 NEXT I
320 GOTO 140
330 IF V$<>"T" THEN 420
340 PRINT "Tie which two ropes ";:INPU
T R1,R2
350 IF F=0 THEN 390
360 U(A(R1))=A(R2)
370 U(A(R2))=A(R1)
380 GOTO 140
```

g

adventures



recent games side by side, how have Level 9 developed? In comparing the two games the first impression is that nothing much has changed in Level 9's presentation. Each location receives a description of the surroundings, plus any useful objects that may be lying around.

The text is often lengthy, in direct contrast to Scott Adams games, where the location details are placed on the screen in a brief and well defined format. While this gives a Level 9 screen an untidy appearance after a few moves, it does give scope for more atmospheric scene setting.

To demonstrate this it takes only a few moves in Colossal Adventure to have visited wide open countryside, travelled along a riverside, followed a stream and spent ages wandering in a maze of caverns occupied by some of the more unsavoury elements of adventuring.

Dwarves and pirates seem to abound in this underground wilderness, and the cautious adventurer is wise to arm himself as quickly as possible to prevent his life being lost.

This is mainly due to the fact that on death you are likely to find that your gains to date, ill-gotten or not, have been spread around the adventure just to make things a little less easy for you.

As you can see, to play a Level 9 game takes a good deal of stamina and persistence, their latest offering being no exception. It also demonstrates a movement in adventures which I for one applaud.

Instead of being a glorified treasure hunt, a theme which has been well explored now, Emerald Isle offers a specific goal.

In it you are a crashlanded pilot, who, en route to deliver valuable documents, made the mistake of taking a short cut across the Bermuda Triangle. Hence you start the game suspended by your parachute in a mangrove forest as a collection of forest predators sense an early lunch.

Although escaping is not a great problem, you soon find yourself blundering around until you find a treetop city. It transpires that the only person allowed to leave the island is its monarch.

This will obviously pose an out-of-work pilot with a few problems, but fortuitously there is a contest to become the ruler, although – as the authors take great pleasure in pointing out – the rules of this competition are not included in the announcement.

Travelling around the city proves to be no real problem once you are dressed for the part, but all is obviously not well.

The clock tower no longer works, despite it being of Victorian design, although Big Ben never seems to have those problems, and just about every gate in the city is locked.

However, a trip to the beach is easy as the rail system here knocks BR into a cocked hat.

On the beach you find the solution to a rather knotty problem that has been troubling the government of late, with the missing Conquerer's log, as well as a starving spider, although you may not need to come to a sticky end. As usual, Level 9 retain their unique brand of humour throughout.

At the moment I am in urgent need of a lamp, preferably working, which is doubtless hidden somewhere far off and obscure. To date I have not indulged myself in Level 9's voluminous hint sheet, despite much hair-tearing and cursing, although this probably explains why my score out of a thousand has yet to reach treble figures!

At £6.95 this has to be the best Level 9 value yet, and I have no hesitation in recommending you to buy this one.

Not such a glowing reference for Murder on the Zinderneuf, I'm afraid. Any game purporting to be an adventure but yet requiring a joystick immediately arouses my suspicions. The basic idea, in the guise of a series of thinly-disguised fictional detectives, is to investigate a missing person case aboard the Zinderneuf, a transatlantic airship.

This is accomplished by steering your detective, silly name and all, around the ship to search for clues and question suspects in a variety of different tones and pursuasive manners until you accuse the murderer. Get enough evidence and they hang. Not enough, or just plain wrong, and you carry on searching.

The manual which accompanies the game is neatly produced, including a map of the rooms on the ship, and potted biographies of the characters involved. Each game takes place in simulated real time, and by reference to the manual you can soon get the hang of which way to go to search a room.

Searching, however, consists of wandering around a room until a message appears to tell you either what you have found, or that there is

→

ul riddle

```
390 D(B(R1))=B(R2)
400 D(B(R2))=B(R1)
410 GOTO 140
420 IF V$<>"p" THEN 130
430 PRINT "Pull which rope";:INPUT R
440 IF N=3 THEN 490
450 IF F=1 THEN X=D(R):GOTO 460
455 X=U(R)
460 IF F=1 THEN D$="down":GOTO 470
465 D$="up"
470 IF INT(X)=0 THEN PRINT "Nothing ha
ppens":GOTO 140
475 PRINT "Rope ";INT(X);" moves ";D$
480 GOTO 140
490 FOR I=1 TO B(R)
500 PRINT "Bong!"
510 NEXT I
520 B=B+1
530 IF B(R)<>B THEN PRINT "QUASIMODO k
nocks 7 bells out of you !":STOP
540 IF B=N THEN PRINT "QUASIMODO gives
 you a gold ring":STOP
550 GOTO 140
```

nothing of interest. Nothing very adventurous there.

The graphics are clear and the scrolling is also well executed, but overall the game left me with a feeling of playing a souped-up Cluedo. At £11.95 for the disc from Ariolasoft, I thought this was a trifle steep, so it's "frustrated Cluedo addicts only" for this one.

Two last comments on the column to date. As you can see, there are numerous problems in adventures, so if you are stuck, don't hurl the cassette through the nearest window, but drop me a line and I'll do my best to help out without actually telling you the answer.

Also, if you find any bugs or problems with a game, let me know. A lot of them can be rather amusing. Just to start you off, Level 9 has a lawn in Emerald Isle, yet the response to GO LAWN isn't quite what you would expect. Nobody's perfect!

Housing the Fifteen

THE problem posed in the June issue of how to become governor and make the Filthy Fifteen STOP is difficult even though there are thousands of solutions. The simplest general method is to modify the program to search through possible combinations, rather like solving the eight queens on a chess board puzzle. Here is one solution:

N1	1.2.3	4.5.6	7.8.9	10.11.12	13.14.15
N2	1.4.7	2.5.8	3.12.15	6.10.14	9.11.13
N3	1.10.13	2.11.14	3.6.9	4.8.12	5.7.15
N4	1.5.14	2.9.12	3.4.13	6.7.11	8.10.15
N5	1.8.11	2.6.15	3.7.10	4.9.14	5.12.13
N6	1.9.15	2.4.10	3.5.11	6.8.13	7.12.14
N7	1.6.12	2.7.13	3.8.14	4.11.15	5.9.10

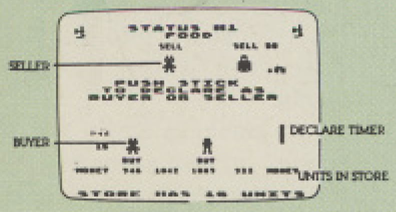
Strategy's the name of the game

EVERY so often, a game comes along that reeks of class. **M.U.L.E.** is one of those games. It will delight you, from its catchy theme music to your last auction.

M.U.L.E. is a strategic game, involving cunning and a touch of the stock market. "What?" I hear you say, "Not one marauding alien to blast into oblivion? Boring".

M.U.L.E. is anything but boring. I enjoyed playing the game for hours on end.

The idea of M.U.L.E. is that you have been left on a planet and in order to survive you



must develop the natural resources of the world.

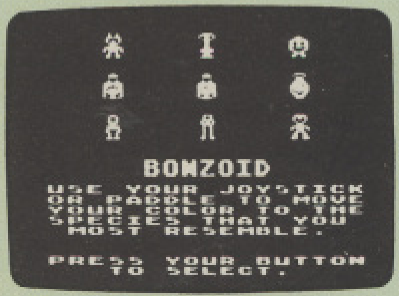
This is achieved by your M.U.L.E. (Multiple Use Labour Element) – a robot designed to do all your strenuous mining tasks.

Each M.U.L.E. has to be outfitted for developing the different resources, which are food, energy and smithore.

M.U.L.E.s are made from smithore, which makes it a precious substance. Once outfitted, you must install it in your plot of land.

In the one-player game, you are competing against three computer-controlled players, but you may play against your friends if desired.

After developing your stock, you go to the auction round,



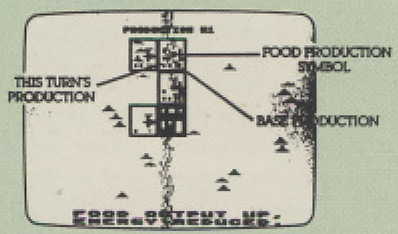
where you can buy or sell your stock to the other players.

This is where all you closet businessmen and women will emerge as you collude and haggle over prices.

After the auction round has finished, you are then awarded a free plot of land to develop.

You might think it's easy – but just watch out for the pirates who will steal your hard-earned stock.

Also, the storms will drive your M.U.L.E.s crazy. And there are other little problems



that make sure you never have a dull moment.

There are plenty of other features in the game, but it would take a few pages just to note them down, let alone explain them.

To understand the game at its full potential, you really should read your manual.

M.U.L.E. has three levels – beginner, standard and tournament. Each level is challenging and enjoyable.

The game is fun to play and has some nice little graphic touches and sound.

However, one possible improvement could have been the ability to save your game to disc.

This is quality software from Electronic Arts, which is to be expected from this renowned software house.

M.U.L.E. will certainly become part of my collection.

Pete Irvin

TRYING HARD, BUT...

THE latest game from English Software, **Kissin' Kousins,** has an interesting innovation – speech. But don't get too excited – there's precious little of it.

Kissin' Kousins is an arcade game in the mould of Hunchback, Popeye and others of that ilk. You must guide the tiny hero past a series of hazards in order to save the heroine.

Immediately the game has loaded, you'll hear a clear and cheerful voice declaring "English Software presents Kissin' Kousins!"

Very impressive. Only trouble is, that's the last time you'll hear that particular snatch unless you reload the game.

The only other speech I encountered was on the title screen. Here a damsel in distress was shouting "Save me!"

This wasn't so impressive. The voice sounded more like a trainee female impersonator with a sore throat.

Still, this is a step in the



right direction and deserves full marks for effort.

So what about the game itself? Well, I'm afraid it's not one of English Software's best.

The backdrop to the game is a static street with buildings, stores and hoardings, most of the action taking place on a narrow strip of the screen.

The obstacles on screen one include bushes, hydrants and dustbins with pop-up lids. These are placed at ever-decreasing intervals, so the timing of your jumps is critical.

Just to add to the difficulty, a plane flies overhead dropping large red bombs, and each screen must be completed within a tight time-limit.

If you hit an obstacle, get blasted by a bomb, or just run out of time, you lose one of your five lives and must start at the beginning of that screen.

When all lives are lost, the scene scrolls to reveal a large hoarding showing "Game Over".

Once you've safely reached the right-hand side, the picture scrolls smoothly to the left to reveal the next section.

Screen two has wriggling caterpillars as the major obstacle. Later sections include bouncing kangaroos, bats and frogs.

The frustrating thing about the game is that there is no option to start again from the last screen completed. You always recommence right back at the very beginning.

Although it's a fair game, Kissin' Kousins lacks variety and excitement. Not one I'd go out of my way to buy, but worth a play.

Bob Chappell

Riveting, no less

HARD Hat Mack, by Electronic Arts, is a levels and ladders game. The action takes place on a building site and there are three completely different screens.

To succeed on the first you must climb to the top by filling in gaps in the platforms using steel girders.

While doing so you must avoid rivets which are being thrown down from above by an invisible assailant.

Once you have plugged all the gaps, you have to rivet each girder in place with a special gun that zips along the levels looking rather like a spinning top.

To assist your progress there are chains at one end of each platform which you can climb up.

In addition, there is a trampoline that you can use to bounce up to the next levels, and there is also a lift at your disposal which takes you up three levels.

On the second screen you have to race around collecting lunch-boxes.

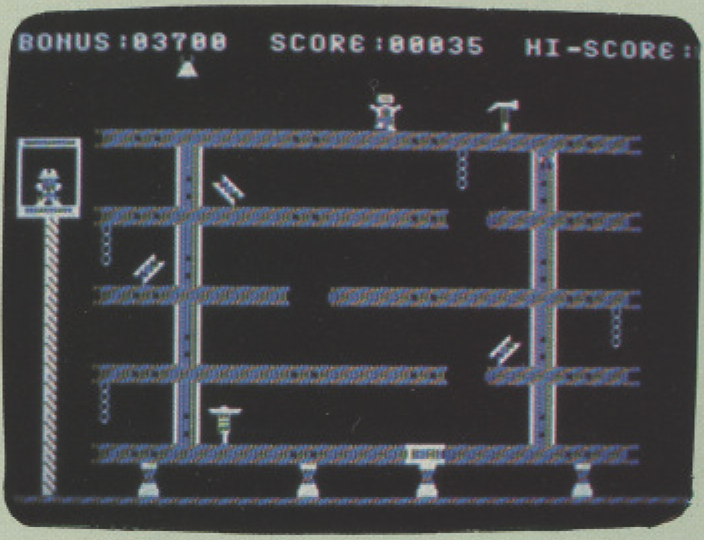
In order to access the different levels you have to hop on to a girder which is hoisted up and down by a winch.

On the first two screens there is a meanie called Vandal, whose sole purpose is to make life unpleasant for you. One touch from him and you're dead.

On the third screen two meanies appear – Vandal and Osha, a robot-like creature. On this screen you must collect boxes and put them into a chute. In the centre there are lifts that Hard Hat Mack can ride to get to the different levels.

The game is in black and white, and as a result the hi-res graphic detail is superb. Naturally the game as a result lacks colour, but you can't have your cake and eat it.

It could perhaps have been improved by the addition of



Mack has a riveting time

some more different screens, and a keyboard option would cater for those unfortunate Atarians who haven't got access to joysticks.

Nevertheless the game is extremely addictive and great fun to play. And, if you'll excuse just one pun, if your tastes are like mine you'll stay riveted for hours!

The cassette version costs £9.95 and the disc version is £12.95.

David Andrews

Given the bird – and loved it

WHEN Miner 2049'er was released on an unsuspecting Atari computer-owning public some two or three years ago, little could its creators have realised what a phenomenal amount of clones it would spawn.

Every popular machine has more than its fair share of jumping and climbing games, the best-known probably being the Miner Willy games available for the Spectrum.

One thing that all these games have in common is that they owe their concept to Miner 2049'er – and we Atari owners are smug in the knowledge that we saw it first.

Now – after what is probably the longest-ever wait for a follow-up in computer games history – comes **Bounty Bob Strikes Back.**

Originally to be called Scraper Caper, this game has arrived well over a year after full-colour double-page advertisements for it appeared in American computer magazines. Talk about starting the hype early!

All of this, of course, leads to the inevitable question – was it worth the wait?

The answer must be a resounding YES!

I made arrangements to borrow the cartridge from a (rich) friend (thanks, Nigel) who had bought it direct from the States at great expense (the pound was just about one for one against the dollar at the time).

The time limit on the loan was to be a maximum of two weeks as he couldn't bear to be parted from it for any longer.

The whole Bounty Bob package reeks of sharp American techno-flash, right from the box, which is at least five times bigger than it needs to be, the instructions, which are in the form of a giant full-colour poster, and, fortunately, the game itself.

I inserted the cartridge into the left-hand slot of my trusty Atari 800, switched on and – what? A grid with birds flying around carrying letters? Could this be the correct game I had here?

But sure enough it was. The birds actually fly all around the screen and drop the letters into the grid and spell out the game title, programming information and other relevant details.

The option key gives access to a user definable customiser screen which includes the amount of lives for Bob, difficulty level, music volume – you name it, you can change it.

There is even a line called special code which the instructions say little about, only that it allows Big Five programmers access to the games code.

One surprising omission is the inability to enter the game from anything but level one, but this is sorted out after clearing certain levels of the game.

Secret messages are flashed on to the screen with the necessary information to enter the game at higher levels.

On pushing Start, the first screen scrolls smoothly from the bottom to the top of the TV screen in that familiar way that we Atarians know and love.

And, suddenly, there they all are – Bob, the mutants and the transporters that we've all seen before on Miner 2049'er.

Then came the first feeling – of disappointment. Was this just going to be a re-run of Miner?

Bob certainly looked exactly the same – that old familiar grin on his face and his battered hat perching jauntily on his head, shuffling along filling in rectangles fit to bust.

It took me quite some time getting through that first screen, but I'm glad I persevered with it – from the second screen on, the action gets far more fast and furious and every screen is absolutely alive with a whole wealth of new and reworked ideas.

I only managed to get to level five and I played the game a heck of a lot in the two weeks that I had it.

Not since Boulderdash (which I personally rate as the best computer game of all time) have I come across such a 100 per cent addictive game.

It is so alive with great ideas that you'll eagerly play it until two in the morning just to glimpse the next screen, so

you can go to bed and have nightmares about how the heck you're ever going to get through it the next day.

Just a quick word about the hi-score screen. It's about the most inventive I've ever seen. Just take a look for yourself.

The only minus point I can think of about the game is that I can't find a way to cheat by jumping into any level.

Typing in the Big Five phone number to jump levels in Miner 2049'er was an open secret to most Atari-owners. I've yet to find the secret on Bounty Bob.

I'm sure it's something to do with that special code on the customiser screen.

It's certainly not the phone number this time around – I've tried. And besides, the phone number is used to warp you out of tricky situations where you would normally have to wait for the game's timer to count you out.

Incidentally, for those of you who must be wondering at this point – No, I don't work for Big Five Software, I don't know the programmers personally, and I sure haven't got shares in the company – I'm just a dedicated Atari user who loves classy games.

At the time of writing, Bounty Bob was only available on import from America, at the horrendous price of £49.95.

But the good news is that US Gold should be bringing it out soon for a lot less.

It'll be the bargain of the century, so beg, borrow, or sell your old Dragon (no, not your mum, stupid) but rake up the money somehow and make sure you get a copy.

David Rolls

The hard route to the top

IF chess is a little too violent for your delicate sensibilities, if you'd rather run away than attack and capture, perhaps you need **Pensate** from Penguin Software.

In this game the object is simply to get from the bottom of the 8 x 8 board to the top while avoiding the computer's pieces.

The computer has 10 different pieces available, some of which move in a different way depending on how *you* move. The direction arrows always move the way they are pointing, but the other pieces are more devious.

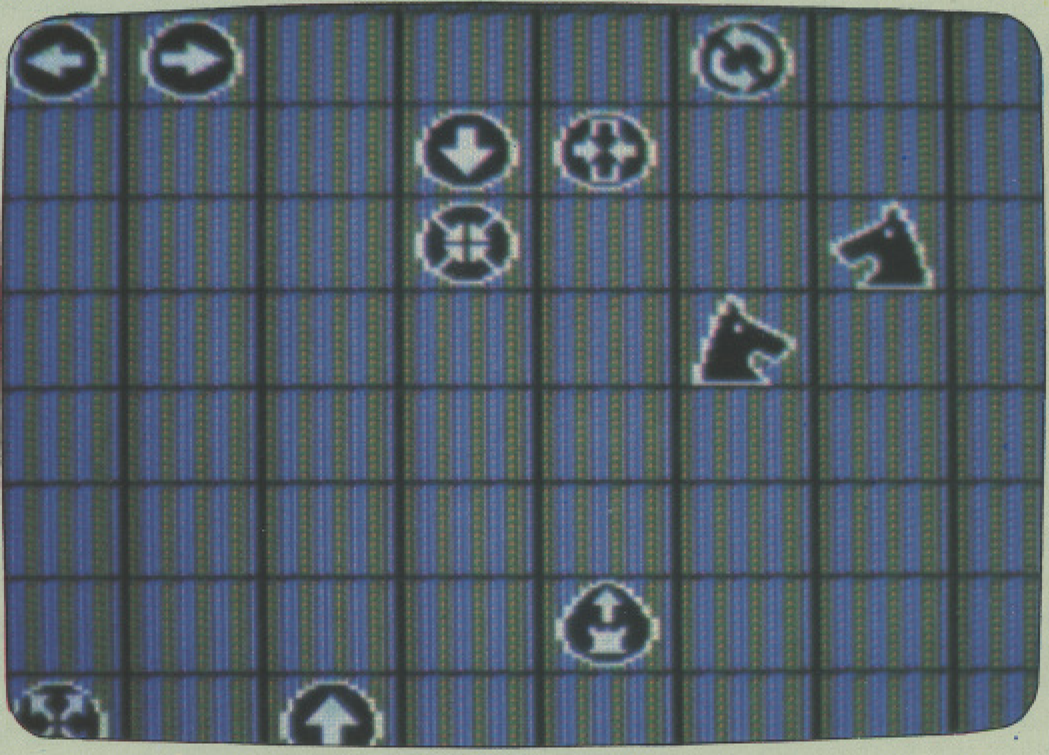
For example, the piece with black and white arrows always moves in the opposite direction to you. The piece which looks like a continental roundabout sign moves left or right if you move up or down, and moves up or down if you move right or left.

The two horse pieces have a chess knight's move, but in a particular direction depending on which way you go.

There are two basic modes – practice and tournament – and you'll need to start in the former. In this, you can choose which pieces the computer has on the board and also their starting positions.

In practice mode it's very easy to win if you're desperate to. Simply give the computer a couple of pieces that will do nothing but move out of your way.

Of course, the more interesting games are played in tournament mode. Here you get to specify the skill level at which you play, and this determines the complexity of the playing pieces which the computer chooses for itself.



The Pensate pieces have devious ways of moving

However tournament mode also requires you to play at least two moves ahead. That is, you specify your next two moves each time.

Your first move is taken, then the computer moves its pieces one at a time. Then this process is repeated with your second move, following which you specify your next two moves.

Once you really get the hang of it you can choose to play up to four moves ahead. If the computer has a few complex pieces on the board it can get quite tricky trying to see into the future.

You win by getting to the top of the board and you lose by coinciding with one of the other pieces. However if one of the computer's pieces lands on another it makes its own move again.

The computer has the added advantage that its pieces "wrap around". If they hit the edge they reappear at the opposite edge. If your pieces hit the edge they get flat noses.

While you're learning you can set the speed option to slow and watch the pieces make their moves. The manual promises that once you've mastered the moves "a faster speed will allow victory to come swiftly". Yes, but victory for whom?

At lower levels Pensate is a little tame and you get blasé about the victory tune. However once you get involved and move up a few levels it's a real brain-bender. It's then that the tune becomes a true reward.

The facility to start very simply makes Pensate a very accessible game, but don't be fooled. If it grabs you it could change the way you move around the office.

Cliff McKnight

Redefine cheating

Part Three of DAVE RUSSELL's series on the Atari graphics modes

WE looked at Graphics 1 and 2 last month and saw how they were split screen text modes. We also saw that only half the character set was immediately available – normally the numbers and upper case letters.

Now we'll access the "hidden" half of the character set and see how we can use lower case letters in Modes 1 and 2.

Let's start with one of the little programs from last month. Type in and run Program I:

```
10 GRAPHICS 1
20 POSITION 5,5
30 PRINT #6;"ATARI USER"
```

Program I

It should produce our name in orange upper case letters and the word Ready should be in the text window at the bottom of the screen.

The operating system can only see the half of the character set containing upper case letters at the moment. However there is a location in memory which tells the system which half to look at.

Location 756 usually contains the value 224, which specifies the upper case half of the character set. If you'd like to verify this, simply type:

PRINT PEEK(756)

in the text window. The value 224 should appear at the top of the text window.

In order to convert our name to lower case all you need to do is change the value in location 756 to 226. You can do this by entering:

POKE 756,226

in the text window. Try it now and see what happens. There's our name in lower case as promised, but what are all those hearts doing there?

If you laid the two halves of the character set out next to each other, the lower case letters would line up with the upper case letters. That's why ATARI gets changed to atari.

The hearts arise from the fact that the space character lines up with the special graphic heart shape. Consequently changing the value of location 756 to 226 causes a heart to be printed wherever a space was printed previously, which in this case means most of the screen.

A screenful of hearts might be useful on one particular day in February, but for most of the time they tend to clutter up the display.

There are two ways we can get rid of the hearts, one by "cheating" and losing one of the available colours, the other by redefining the character set. With the screenful of hearts, enter:

SETCOLOR 0,0,0

and the screen should be blank again. All you've done is change the colour in register 0 to the same colour as the background. Hence the hearts are still there in one sense – they're just printed in the same colour as the background. It's a bit like using black chalk on a blackboard.

Unfortunately although our name is still there, we can't read it because its colour was also defined by register 0. We saw how to change colour last month by using lower case letters to select a different colour register, so we can use this technique now to restore our name.

Press Reset and enter Program II:

```
10 GRAPHICS 1
20 SETCOLOR 0,0,0
30 POKE 756,226
40 POSITION 5,5
50 PRINT #6;"atari user"
```

Program II

When run it will produce the familiar result in lower case, with the letters now being green instead of orange because register 1 is selected.

The second method of removing the hearts requires a little more work but introduces a technique which can be put to good use in other ways. It requires us to redefine the character set.

When you turn your micro on the characters are already there because they are held in read-only memory – ROM. As the name implies, we can only read from this sort of memory, we can't write to it or alter it.

Now if the character set was in RAM – random access memory, more properly called read and write memory – we could change it at will. What we must do, then, is move the character set into RAM so that we can change the heart character to something else.

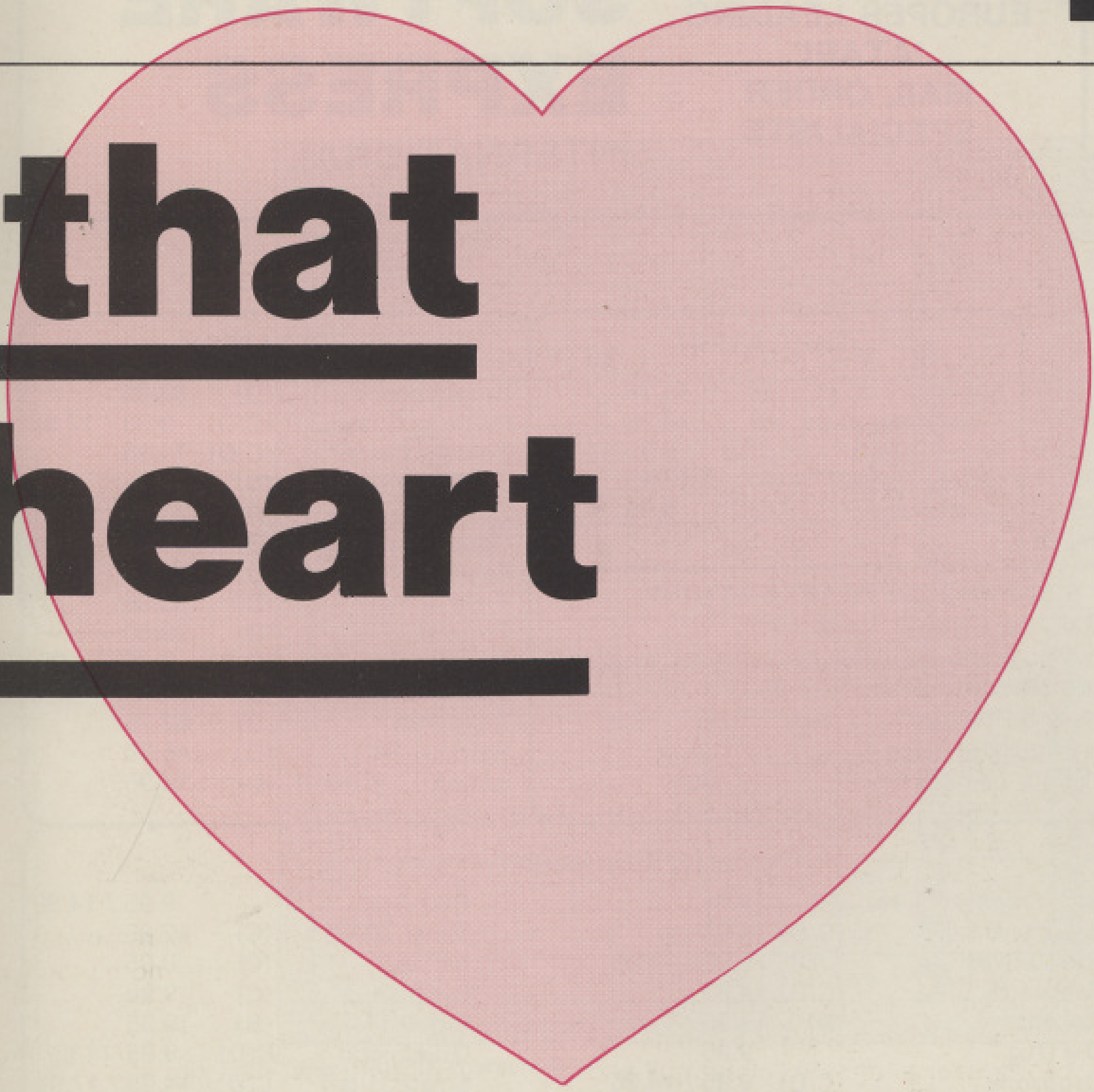
We don't actually move the character set, we simply copy it, just like taking a photocopy. However before we do this we need to know how the micro represents the characters if we're going to change some of them.

If you look closely at the heart shapes you'll see that they are made up of little dots. The micro represents each dot as a bit of information in its memory, and each memory location can store eight bits, or a byte as it's known.

If you've been following Mike Bibby's Bit Wise series you'll know that a bit can be either 1 or 0. If it is 1, then a dot gets printed on the screen. If it is zero, no dot is printed.

Each character is represented as

e that heart



an 8 x 8 matrix of dots, and so requires eight bytes of memory. The bit pattern for the heart shape looks like this:

00000000
00110110
01111111
01111111
00111110
00011100
00001000
00000000

With not too much difficulty you can see that the 1s form a heart shape against a background of 0s.

Each row of the matrix can also be read as a number by converting the binary representation to decimal. The top row of the heart would be 0, the second row would be 54, the third row would be 127 and so forth.

In order to redefine the heart shape as a space, we need to set the bit pattern of the character to the bit pattern of a space. Fortunately, the bit pattern of a space is easy to remember – it's simply eight rows of eight zeros. All we need to know now is where the bit pattern is held in memory. We'll know that when we decide where we're going to put the character set in RAM.

Program III copies the character set into RAM and redefines the heart shape as a space. However it needs to do some "housekeeping" on the way, so I'll explain what each line is doing.

```
10 RAMTOP=PEEK(106)
20 POKE 106,RAMTOP-4
30 GRAPHICS 1
40 CHBAS=RAMTOP-4
50 ADDR=CHBAS*256
60 FOR X=0 TO 1023
70 POKE ADDR+X,PEEK(57344+X)
80 NEXT X
90 CHAR=64
100 POS=ADDR+(CHAR*8)
110 FOR X=0 TO 7
120 READ A
130 POKE (POS+X),A
140 NEXT X
150 DATA 0,0,0,0,0,0,0,0
160 POKE 756,CHBAS+2
170 POSITION 5,5
180 PRINT #6;"ATARI USER"
```

Program III

The character set occupies 1k of memory, so we need to set aside this amount of RAM and protect it in order that the rest of our program doesn't interfere with it. The easiest way to do this is to move the top of memory down by 1k and put the character set in there. If we tell the micro that we've done this, it will do the necessary protecting for us.

Memory is organised in $\frac{1}{4}$k (or 256 bytes) pages and so we need four pages of memory for the character set. Memory location 106 holds the current position of RAMTOP, the top of RAM memory, so line 10 looks at the current value and line 20 moves the value down by 4 pages, giving us the necessary 1k.

Before we move the character set we must tell the micro that we've moved RAMTOP, otherwise we might write over the display list. The easiest way to do this is to issue a Graphics command, hence line 30.

We'll call the beginning of the character set CHBAS. Line 40 tells the micro where CHBAS is to begin, with line 50 giving the actual location.

In ROM the character set begins at location 57344, so the loop from line 60 to line 80 pokes a value into ADDR corresponding to the value held in 57344.

The loop counter increments by 1, so next the value held in 57344+1 is poked into ADDR+1. This loop is carried out 1024 (or 1k) times, resulting in a copy of the character set being poked into RAM and starting at ADDR.

The heart is character number 64 and each character requires eight memory locations. Since we know that the set begins at ADDR, we can work out that the heart begins at ADDR + (64*8). Lines 90 and 100 provide the program with this information.

For each of the eight bytes of the heart character in turn the loop from 110 to 140 writes a 0, as taken from the data in line 150. This replaces the heart with a blank.

Lines 160 to 180 give us our old favourite message, but this time it's in lower case orange.

If you use this routine in your own programs, use:

POKE 756,CHBAS

to access the upper case characters and:

POKE 756,CHBAS+2

to access the lower case characters.

The advantages of this technique

→

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Column 1				Column 2				Column 3				Column 4			
No.	CHR	No.	CHR	No.	CHR	No.	CHR	No.	CHR	No.	CHR	No.	CHR	No.	CHR
0	Space	16	0	32	@	48	P	64		80		96		112	p
1	!	17	1	33	A	49	Q	65		81		97	a	113	q
2	"	18	2	34	B	50	R	66		82		98	b	114	r
3	#	19	3	35	C	51	S	67		83		99	c	115	s
4	$	20	4	36	D	52	T	68		84		100	d	116	t
5	%	21	5	37	E	53	U	69		85		101	e	117	u
6	&	22	6	38	F	54	V	70		86		102	f	118	v
7	'	23	7	39	G	55	W	71		87		103	g	119	w
8	(	24	8	40	H	56	X	72		88		104	h	120	x
9	)	25	9	41	I	57	Y	73		89		105	i	121	y
10	*	26	:	42	J	58	Z	74		90		106	j	122	z
11	+	27	;	43	K	59	[	75		91	(1)	107	k	123	
12	,	28	<	44	L	60	\	76		92	↑	108	l	124	|
13	–	29	=	45	M	61	]	77		93	↓	109	m	125	(1) ↖
14	.	30	>	46	N	62	∧	78		94	←	110	n	126	(1) ◀
15	/	31	?	47	O	63	_	79		95	→	111	o	127	(1) ▶

1. In Mode 0 these characters must be preceded with an Escape, CHR$(27), to be printed.

Table I: Internal character set

over the colour-changing "cheat" method are that all the colours are available and you can redefine any of the characters. All you need to know is the internal character number of the character that you want to change.

For a simple demonstration of redefining the heart to something visible, change all the 0s in line 150 to 1s.

Last month we saw how in Modes 1 and 2 the COLOR command selects the character to be PLOTted. By adding 32 to the character, we produced a different colour but didn't say where the number 32 came from.

Now that we've seen how to use location 756, we can use the COLOR/PLOT combination to produce multi-coloured messages. In order to do this you'll need to use Tables 1 and 2, which are adapted from pages 55 and 56 of the Atari Basic Reference Manual. (Note that Table 2 corrects an error in the original.)

Find the character you want in Table I. If it is in column 1 or 2 it is part of the upper case set. If it is in column 3 or 4 it is part of the lower case set. Remember that at the level we're operating we can't mix upper and lower case characters.

Suppose we want to plot an A in the colour contained in register 0 (orange). Table 1 tells us that A's character number is 33 (column 2) and Table 2 tells us that in order to plot column 2 characters in register 0 colour we must add 32 to the character number.

If we'd wanted to plot the A in register 3's colour (purple), Table 2 tells us that we would have to add 192 to the character number.

The registers contain their default values but we can alter them using the SETCOLOR command as we saw in the May issue of *Atari User*.

To illustrate the use of the conversion factors type in Program 4 while you've still got Program 3 in memory. It overwrites lines 170 and 180 and adds lines 190-220, using the same technique as we used last month.

```
170 FOR A=1 TO 10
180 READ X
190 COLOR X
200 PLOT A+5,5
210 NEXT A
220 DATA 65,116,193,242,73,32,.
117,211, 229,82
```

Program IV

I'll leave you to play with the actual colours displayed by changing the contents of the registers via SET-COLOR. You can get some nice effects with a well-place FOR ... NEXT loop.

		POKE 756,224		POKE 756,226	
Mode 1 or Mode 2	SETCOLOR 0	+32	+32	–32	–32
	SETCOLOR 1	None	+64	–64	None
	SETCOLOR 2	+160	+160	+96	+96
	SETCOLOR 3	+128	+192	+64	+128

Table II: Character colour assignment

Antic ... the reason Atari graphics pack such a mighty punch

MIKE ROWE begins a series on how to produce spectacular displays with an Atari

ONE of the Atari's most renowned and spectacular features is its graphics capability. The machine has 16 different graphics modes and can display up to 16 colours from Basic (256 using machine code).

This is more than any of its rivals and more than many computers costing thousands of pounds. The reason the Atari is able to perform these feats is the inclusion of a chip called Antic to look after screen display.

This is a microprocessor in its own right and runs alongside the 6502 main microprocessor, freeing that for the user program. In addition there is the GTIA chip, which is also a microprocessor. This creates the famous Atari player-missile graphics and interfaces the computer to the TV display.

For those of you who are new to your Atari the 16 modes consist of five modes that display text and 11 modes that display graphics. These are shown in Figure I.

You may have noticed that there are two kinds of mode number, Basic and Antic. The Basic number is that used in a graphics call from a Basic program. For example Graphics 0 gives you the standard 40 × 24 text mode.

The Antic mode number is the one stored in memory to be used by the Antic chip to tell it what kind of screen to display. This is calculated from the Basic mode number and stored in the correct location in memory by the computer's operating system – the Antic number of Basic graphics Mode 0 is in fact 2. Using the Antic mode numbers directly without a Basic graphics call will be explained in later articles.

Don't ask me why Atari had to make the two numbers different, but they did and we're stuck with it. From now on, when I refer to graphics modes I mean the Basic mode and if I want to refer to the Antic mode I will specify Antic.

How does the Antic chip work? A television picture is created by a beam of electrons hitting a fluorescent screen on the inside of your TV

Basic mode number	Antic mode number	Text or graphics	Number of colours	Columns	Rows full	Rows split	Bytes of memory needed
0	2	TEXT	2	40	24	–	993
1	6	TEXT	5	20	24	20	513
2	7	TEXT	5	20	12	10	261
3	8	GRAPHICS	4	40	24	20	273
4	9	GRAPHICS	2	80	48	40	537
5	10	GRAPHICS	4	80	48	40	1017
6	11	GRAPHICS	2	160	96	80	2025
7	13	GRAPHICS	4	160	96	80	3945
8	15	GRAPHICS	2	320	192	160	7900
9	15	GRAPHICS	1*	80	192	–	7900
10	15	GRAPHICS	8	80	192	–	7900
11	15	GRAPHICS	16	80	192	–	7900
12	4	TEXT/GR	5	40	24	20	1152
13	5	TEXT/GR	5	40	12	10	664
14	12	GRAPHICS	2	160	192	160	4296
15	14	GRAPHICS	4	160	192	160	8138

* = 16 Shades of 1 colour

Note that graphics modes 12-15 are available directly from Basic only on the XLs. They can only be obtained on the 400/800 computers by creating the mode yourself.

Figure I: Graphics modes

tube (oversimplified). The beam is made to scan horizontally in sequential lines across the screen and the whole screen is covered 50 times a second.

A normal TV picture consists of 625 of the lines (in fact it consists of 312 interlacing, alternating lines). The computer display, to avoid overscanning the TV and losing data, consists of only 192 lines, leaving a gap at top and bottom of the screen.

Antic is able to control each scan line individually and up to 320 individual pixels horizontally. A pixel is a single point on the screen created by the computer and therefore the smallest dot it can make.

In between each horizontal scan of a line there is a small delay – the horizontal blank. Also between each time the screen is drawn there is another delay – the vertical blank. More of these later.

The higher resolution modes (192 vertical resolution, say Graphics 8) use one scan line per horizontal row of the screen. However other modes use up to 16 scan lines per line of the graphics mode.

The scan lines used are:

Basic mode	Vertical resolution	Scan lines/ mode line
0	24	8
1	24	8
2	12	16
3	24	8
4	48	4
5	48	4
6	96	2
7	96	2
8-11	192	1
12	24	8
13	12	16
14	192	1
15	192	1

The next question is, how does Antic know what to display? The answer lies in the display list, a small machine code program interpreted by Antic to give the display. It tells the chip two main things:

- The Antic graphics mode number for each line.
- The memory location of the screen display.

It is normally created and manipulated by the computer's operating system and the Basic programmer can forget it.

The whereabouts of the display list is stored in rather a complicated way, in memory locations decimal 560 and 561, because a computer does not work in decimal (base 10) as we do. It works in binary numbers (base 2).

These are often expressed as hexadecimal (base 16) – see Mike Bibby's Bit Wise article on Page 46 for an explanation of this.

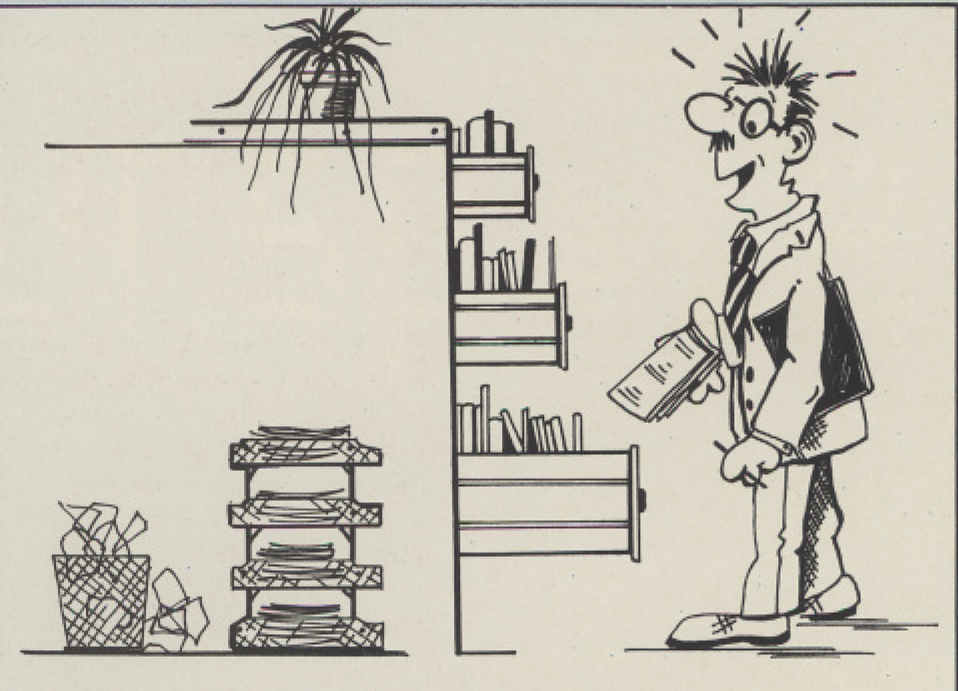
Every memory location in the computer can store a number between 0 and 255. Therefore to express numbers greater than 255 you must use two memory locations. So to store a number such as 42000 you must split it into two parts. This is done by firstly finding the number of times 256 will divide into it and secondly the remainder.

The first number is known as the high byte of the number and the remainder is the low byte. They are stored in memory in the order low byte, high byte. For example, for 42000 you get 42000/256=164 remainder 16. The high byte is 164 and the low byte 16.

If 42000 was the location of the display list then 560 would contain 16 and 561 would contain 164 (if there is no remainder then 0 must be stored in 560).

Conversely, to find where the display list is located you multiply the number in location 561 by 256 and add this to the number in location 560, that is PEEK(561)*256+PEEK(560) gives the location of the display list.

Most display lists are very short,



'Stored in a rather complicated way . . .'

Decimal	Hex	
112	70	) 3 lines
112	70	) each of 8 blank
112	70	)scan lines
66	42	=64 (LMS Instruction) +2 (Graphics 0 line)
64	40	) Screen memory location
156	9C	)=64+156*256
2	02	) 23 lines the same
"	""	) i.e. 23 Basic Graphics 0 lines
65	41	=64+1 End of display list & JuMP to
32	20	) Memory location of start of list
156	9C	)=32+156*256

Figure II: Graphics 0 display list

usually less than 100 bytes. The display list used for Graphics 0 is typical and is shown in Figure II.

To some extent the display list is fairly self-explanatory, however a few things need expanding. Firstly, the LMS instruction. This means Load Memory Scan and tells Antic to look at the next two instructions to find where in memory the screen should be displayed from.

The above display list has only one LMS instruction but a display list can have several of these pointing to different memory locations, and can even have a different LMS for each mode line.

Therefore any mode number can be added to an LMS instruction to tell Antic to look for its display data wherever you wish. The above display list starts with three lines, each of eight blank scan lines to give 24 blank scan lines at the start of the list.

All the standard graphics modes start with this. The number 112 ($70) is only one of several "blank line" instructions:

Decimal	Hex	Number of blank scan lines
112	70	8
96	60	7
80	50	6
64	40	5
48	30	4
32	20	3
16	10	2
0	00	1

The end of the display list can be split into three numbers starting with a 65 ($41). This can be divided into 1+64. The 1 tells the display list to jump and the 64 is an LMS telling Antic that a memory location follows. The next two numbers are therefore the memory location that the list jumps to, in this case the start of the list. These two numbers will be the same as in memory location 560 and 561 respectively, as they point back to the beginning of the display list.

Other instructions may also be included in the list and the following table gives the instruction codes that can be included in a display list by adding it to the Antic mode number. We'll see more of these in later articles.

Decimal	Hex	Instruction
16	10	Horizontal scroll
32	20	Vertical scroll
64	40	LMS
128	80	Jump to the display list interrupt

This is all very interesting, I hear you say, but of what use is it and do I really need to know all this? Well, if you are happy to have just the 16 simple modes provided then no!

However, much more spectacular and attractive displays become available if you can understand this and know how to alter things to your heart's desires. This is done by creating your own custom display list and mixing modes on the same screen and by creating things called display list interrupts.

More about these next time.


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Get right to th heart of your m

KEVIN EDWARDS shows how to exa mi machine code by employing a disas er

AT the heart of all the Atari computers, except the ST range, is the 6502 central processing unit, CPU for short, which is responsible for keeping your micro working. It does this by executing complex programs which are contained in memory.

Machine code programs consist of binary numbers, each having a different meaning to the CPU. Now we humans aren't much good at making sense of a series of numbers, but fortunately a disassembler translates these numbers into assembly language.

It's not exactly the Queen's English, but is a lot easier to understand.

The next thing we need to know is the location of the machine code programs which keeps the Atari working – this is known as the operating system or OS.

The OS starts at location 55296 ($D800) and ends at 65535 ($FFFF). So if you're in need of some machine code routines to examine then 55296 is a good place to start.

Don't expect to understand it though. It's fairly complex.

Another large section of machine code program is the Basic interpreter. This can be found in locations 40960 ($A000) to 49151 ($BFFF). No matter what language you program in, it always gets executed by a machine code routine – and you can have a lot of fun trying to fathom out how it works.

Program I is the disassembler.

```
#$XX      - Immediate
$XXXX     - Absolute
$XX       - Zero Page
A         - Accumulator
          - Implied (nothing)
($XX,x)   - Pre-indexed indirect
($XX),y   - Post-indexed indirect
$XX,x     - Zero page,x
$XXXX,x   - Absolute,x
$XXXX,y   - Absolute,y
$XXXX     - Relative
($XXXX)   - Indirect
$XX,y     - zero page,Y
```

Figure I

Type it in and save it. It uses a simple machine code routine to convert a decimal number into hexadecimal. You can see what it does by disassembling it.

When you run the program the message "wait a moment..." will appear. This is printed while the program reads in the data statements.

After this you will be prompted for the start location. This must be a number between 0 and 65535 (0 and $FFFF).

Let's assume 40960 ($A000) has been entered. The program at the address will be disassembled. You'll get something like this:

```
A000 A5 CA      LDA $CA
A002 D0 04      BNE $A008
A004 A5 08      LDA $08
A006 D0 45      BNE $A04D
A008 A2 FF      LDX #$FF
A00A 9A         TXS
```

The first number is the address of the program being disassembled (in hex, as with all numbers printed). The next number indicates the instruction type (the command byte). This can be followed by 0, 1 or 2 bytes which give additional information about the instruction – this specifies a memory location or constant used by the command.

Next, the mnemonic for the instruction is printed. A mnemonic is an abbreviation for the type of operation the command performs. For example, LDA means LoaD Accumulator, and BNE means Branch if Not Equal. If the command byte is invalid three question marks will be printed instead.

After the mnemonic comes the addressing mode. This indicates the way in which the command is to be used. For example, LDA $FF means LoaD the Accumulator with the contents of location $FF. Figure I gives a list of the addressing modes available, where $XX and $XXXX are hexadecimal numbers.

Not all of the addressing modes are available for each command. This is why large amounts of data are needed to indicate which are valid. It would be much simpler to program if every command allowed every addressing mode.

The program will continue disassembling memory until the end of memory is reached (65535,$FFFF) or the S key is pressed.

Pressing S stops the disassembly and requests another start address. You can stop and start the output from the program by pressing Control-1. This is very useful if you're working your way through a complex routine where you need extra time to think.

When you've finished using the program you can exit by pressing Break.

Let's take a look at how the disassembler works. All of the mnemonics are held in the string *MN$*. The mnemonic data for all the 256 commands are in the array *MNUM(n)* – where *n* is the command number.

So by accessing the array *MNUM* we can find the corresponding mnemonic number for the command. Multiplying this by three results in the offset for the three different mnemonic characters in the string *MN$*. Extracting this from the string

the

r micro

exa mine the CPU's
ass embly routine



gives us the desired mnemonic. This is done in lines 210 and 220.

Next we must find which addressing mode is being used and print it out. The addressing modes for the commands are found by examining the array *ADM(n)* – n being the command.

One of 13 subroutines is called

```
10 REM Disassembler
20 REM By Kevin Edwards
30 REM (C) Atari User
40 GRAPHICS 0
45 ? :? "Wait a moment......"
50 DIM MN$(171),MNUM(255),ADM(255),BYT
(12)
60 MN$="???ADCANDASLBCCBCSBEQBITBMIBNE
BPLBRKBVCBVSCLCCLDCLICLVCMPCPXCPYDECDE
XDEYEORINCINXINYJMPJSRLDALDXLDY"
70 MN$(LEN(MN$)+1)="LSRNOPORAPHAPHPPLA
PLPROLRORRTIRTSSBCSECSEDSEISTASTXSTYTA
XTAYTSXTXATXSTYA"
80 FOR LOOP=0 TO 255:READ A:MNUM(LOOP)
=A:NEXT LOOP
90 FOR LOOP=0 TO 255:READ A:ADM(LOOP)=
A:NEXT LOOP
100 FOR LOOP=0 TO 12:READ A:BYT(LOOP)=
A:NEXT LOOP
105 FOR LOOP=1664 TO 1703:READ A:POKE
LOOP,A:NEXT LOOP
110 ? "[illegible]"
120 ? "**** Disassembler ****"
130 ? :? "By Kevin Edwards"
140 POKE 764,255
150 ? :? "Enter start location ";
160 INPUT START
165 IF (START<0) OR (START>65535) THEN
 ? :? "INVALID START":GOTO 140
170 NUM2=START:GOSUB 2010
175 ? "  ";
180 OCD=PEEK(START)
185 IF PEEK(764)=62 THEN GOTO 140
190 A=ADM(OCD):OFST=BYT(A)
195 IF START+OFST>65535 THEN ? :? "END
 OF MEMORY":GOTO 140
200 FOR LOOP=0 TO OFST-1:NUM1=PEEK(LOO
P+START):GOSUB 2100:? " ";:NEXT LOOP
205 FOR LOOP2=LOOP TO 3:? "   ";:NEXT
LOOP2
210 A=MNUM(OCD)*3+1
220 ? MN$(A,A+2);" ";
230 A=ADM(OCD):OFST=BYT(A)
240 ON A+1 GOSUB 400,1800,1700,500,600
,700,800,900,1000,1100,1200,1300,1400
250 START=START+OFST
255 ?
260 GOTO 170
400 ? "[illegible]";:GOSUB 1700:RETURN
500 ? "A";:RETURN
600 RETURN
700 ? "(";:GOSUB 1700:? ",X)";:RETURN
800 ? "(";:GOSUB 1700:? "),Y";:RETURN
900 GOSUB 1700:? ",X";:RETURN
1000 GOSUB 1800:? ",X";:RETURN
1100 GOSUB 1800:? ",Y";:RETURN
1200 ? "$";
1210 IF PEEK(START+1)>127 THEN NUM2=ST
ART-(254-PEEK(START+1)):GOTO 1230
1220 NUM2=START+PEEK(START+1)+2
1230 GOSUB 2000:RETURN
1300 ? "(";:GOSUB 1800:? ")";:RETURN
1400 GOSUB 1700:? ",Y";:RETURN
1700 ? "$";
1710 NUM1=PEEK(START+1):GOSUB 2100
1720 RETURN
1800 ? "$";
1810 NUM2=PEEK(START+1)+256*PEEK(START
+2)
1820 GOSUB 2000:RETURN
2000 REM TWO BYTE HEX OUT
2010 B=USR(1664,NUM2)
2020 FOR LP=0 TO 3:? CHR$(PEEK(1704+LP
));:NEXT LP
2030 RETURN
2100 REM ONE BYTE HEX OUT
2110 B=USR(1675,NUM1)
2120 FOR LP=0 TO 1:? CHR$(PEEK(1704+LP
));:NEXT LP
2130 RETURN
3000 DATA 11,35,0,0,0,35,3,0,37,35,3,0
,0,35,3,0
```

Program I

depending on the previous result – see lines 230 and 240. Figure II shows the addressing modes and corresponding numbers used by the array *ADM(n)*.

Another array, *BYT(12)*, indicates the number of bytes taken up by each addressing mode. This is needed so that the program knows how many bytes to print after the address and by how many the memory address is to be incremented.

As I mentioned, the disassembler has its own machine code routine at location 1664 ($680). This is responsible for converting a decimal number into hexadecimal Ascii characters. It is needed because Atari Basic does not support any command to print numbers in hexadecimal.

The rest of the program is quite straightforward.

Now it's up to you. You can begin by disassembling all those brilliant games to see how they work. Certainly, one of the best ways to improve your programming is to work out how other people's programs achieve their effects.

```
0  - Immediate
1  - Absolute
2  - Zero Page
3  - Accumulator
4  - Implied
5  - Pre-indexed indirect
6  - Post-indexed indirect
7  - Zero page,x
8  - Absolute,x
9  - Absolute,y
10 - Relative
11 - Indirect
12 - zero page,y
```

Figure II

VARIABLES

MN$	String containing the mnemonics.
MNUM(255)	Mnemonic numbers for each command byte.
ADM(255)	Addressing mode for each command byte.
BYT(12)	Number of bytes taken up by each addressing mode.
START	Address currently being disassembled.
OCD	Command byte for current instruction.
A	General purpose.
LOOP,LOOP2,LP	General loop variables.
OFST	Number of bytes used by current instruction.
NUM1	An 8 bit number which is to be printed out in hexadecimal.
NUM2	A 16 bit number which is to be printed out in hexadecimal.

```
3010 DATA 10,35,0,0,0,35,3,0,14,35,0,0
,0,35,3,0
3020 DATA 29,2,0,0,7,2,40,0,39,2,40,0,
7,2,40,0
3030 DATA 8,2,0,0,0,2,40,0,45,2,0,0,0,
2,40,0
3040 DATA 42,24,0,0,0,24,33,0,36,24,33
,0,28,24,33,0
3050 DATA 12,24,0,0,0,24,33,0,16,24,0,
0,0,24,33,0
3060 DATA 43,1,0,0,0,1,41,0,38,1,41,0,
28,1,41,0
3070 DATA 13,1,0,0,0,1,41,0,47,1,0,0,0
,1,41,0
3080 DATA 0,48,0,0,50,48,49,0,23,0,54,
0,50,48,49,0
3090 DATA 4,48,0,0,50,48,49,0,56,48,55
,0,0,48,0,0
3100 DATA 32,30,31,0,32,30,31,0,52,30,
51,0,32,30,31,0
3110 DATA 5,30,0,0,32,30,31,0,17,30,53
,0,32,30,31,0
3120 DATA 20,18,0,0,20,18,21,0,27,18,2
2,0,20,18,21,0
3130 DATA 9,18,0,0,0,18,21,0,15,18,0,0
,0,18,21,0
3140 DATA 19,44,0,0,19,44,25,0,26,44,3
4,0,19,44,25,0
3150 DATA 6,44,0,0,0,44,25,0,46,44,0,0
,0,44,25,0
3200 DATA 4,5,4,4,4,2,2,0,4,0,3,4,4,1,
1,4
3210 DATA 10,6,4,4,4,7,7,4,4,9,4,4,4,8
,8,4
3220 DATA 1,1,4,4,2,2,2,4,4,0,3,4,1,1,
1,4
3230 DATA 10,6,4,4,4,7,7,4,4,9,4,4,4,8
,8,4
3240 DATA 4,5,4,4,4,2,2,4,4,0,3,4,1,1,
1,4
3250 DATA 10,6,4,4,4,7,7,4,4,9,4,4,4,8
,8,4
3260 DATA 4,5,4,4,4,2,2,4,4,0,3,4,11,1
,1,4
3270 DATA 10,6,4,4,4,7,7,4,4,9,4,4,4,8
,8,4
3280 DATA 4,5,4,4,2,2,2,4,4,4,4,4,1,1,
1,4
3290 DATA 10,6,4,4,7,7,12,4,4,9,4,4,4,
8,4,4
3300 DATA 0,5,0,4,2,2,2,4,4,0,4,4,1,1,
1,4
3310 DATA 10,6,4,4,7,7,12,4,4,9,4,4,8,
8,9,4
3320 DATA 0,5,4,4,2,2,2,4,4,0,4,4,1,1,
1,4
3330 DATA 10,6,4,4,4,7,7,4,4,9,4,4,4,8
,8,4
3340 DATA 0,5,4,4,2,2,2,4,4,0,4,4,1,1,
1,4
3350 DATA 10,6,4,4,4,7,7,4,4,9,4,4,4,8
,8,4
3400 DATA 2,3,2,1,1,2,2,2,3,3,2,3,2
3500 DATA 162,0,104,104,32,144,6,104,7
6,144,6
3510 DATA 162,0,104,104,104,72,74,74,7
4,74,32,155,6
3520 DATA 104,41,15,201,10,144,2,105,6
,105,48
3530 DATA 157,160,6,232,96
```


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Your plane is running out of fuel and losing altitude at an alarming rate and there's nowhere to land. The only solution is to flatten the deserted city below and create a landing strip using your cargo of bombs.

The controls of your plane have lost power and no longer function, but pressing the spacebar will release a single bomb. When it's exploded the next can be dropped.

There's a lively tune to accompany the instructions page and appropriate sound effects during the main game. Level 1 is the easiest and if you manage to land you start again on the next level with even taller buildings. The highest score is remembered, so there's always the challenge of trying to beat your best.





Bombing the deserted city to make a landing strip is your only hope of survival in this exciting arcade-style challenge

by ROLAND WADDILOVE

Program Notes

The program is fairly well structured, so shouldn't be too difficult to follow. Each subroutine has been given a title describing its function and there are few GOTOs.

The character set is copied down into RAM so that some of the characters can be redefined. The pointer to the character data at 756 is poked with the new value – the high byte of the start of the data.

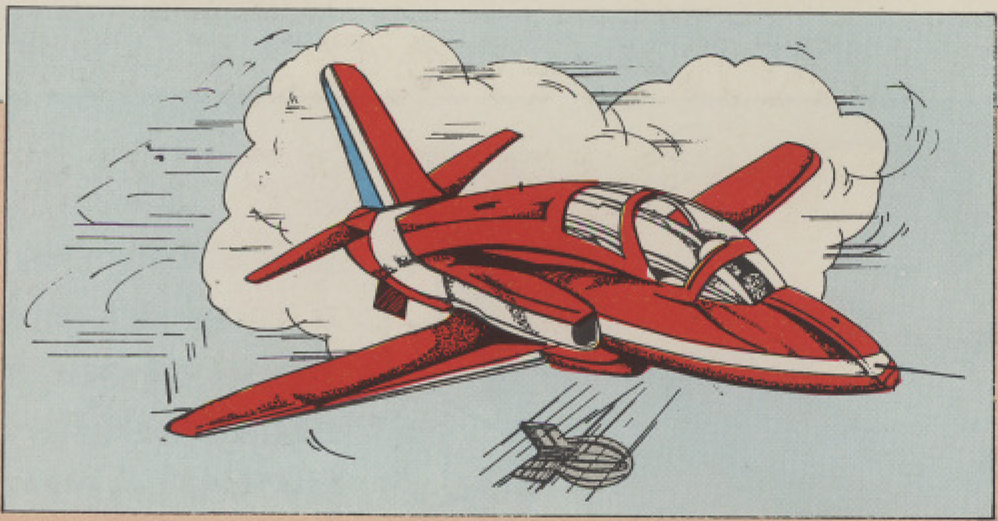
The plane and bomb aren't printed. They are poked directly into the screen memory, which starts at 40320 in graphics mode 1. Also the screen memory is peeked to find out what is in front of the plane and below the bomb.

Peek(764) is used to read the keyboard. This is poked with 255 if there is already a bomb dropping, in order to reset it.

Variables

B	Bomb position.
C	Character below bomb.
E	Number of storeys of building exploded.
H	High score.
I,J	Loop counters.
L	Level.
P	Plane position.
S	Score.

Full listing starts on Page 34



```
10 REM Bomb Run
20 REM By R.A.Maddilove
30 REM (c) Atari User
50 GOSUB 8000:REM instructions
100 GOSUB 9000:REM graphics
110 S=0:L=0
120 GOSUB 5000:REM Screen
200 GOSUB 1000:REM Plane
280 GOSUB 1500:REM bomb
300 IF PEEK(P+1) THEN 400
320 IF P<40730 THEN 200
380 GOTO 120
400 GOSUB 6000:REM bang
450 GOTO 110
500 END
1000 REM Move plane
1100 P=P+1
1110 POKE P,1:POKE P-1,2:POKE P-2,0
1400 RETURN
1500 REM Bomb
1502 FOR I=0 TO 16
1504 IF B THEN N=N+0.5:SOUND 1,N,10,8
1506 NEXT I
1510 IF B=0 THEN 2000
1520 POKE 764,255
1560 B=B+20:C=PEEK(B)
1570 IF C=0 THEN POKE B-20,0:POKE B,19
5:RETURN
1600 IF C=6 OR E=5 THEN SOUND 2,0,0,0:
SOUND 1,0,0,0:POKE B-20,0:B=0:RETURN
1650 SOUND 2,100,0,10
1700 E=E+1:S=S+L
1710 POKE B-20,0:POKE B,195
1740 POSITION 6,23:? #6;S;
1900 RETURN
2000 REM New bomb?
2010 IF PEEK(764)<>33 THEN FOR I=0 TO
40:NEXT I:RETURN
2020 B=P+20:E=0:N=10
2030 IF PEEK(B)>0 THEN B=0:RETURN
2080 POKE B,195:SOUND 1,N,10,8
2200 RETURN
5000 REM Draw screen
5050 L=L+1
5100 POSITION 0,23:PRINT #6;"score:";S
;"  ";
5110 POSITION 10,23:PRINT #6;"level:";
L;
5120 POSITION 0,21:PRINT #6;"&&&&&&&&&
&&&&&&&&&&&"
5130 FOR I=1 TO 18
5135 SOUND 0,150+INT(100*RND(1)),10,5
5140 FOR J=0 TO INT(RND(1)*(L+6))
5150 POSITION I,20-J:PRINT #6;CHR$(36+
128)
5155 FOR K=1 TO 5:NEXT K
5160 NEXT J
5170 POSITION I,20-J:PRINT #6;CHR$(37+
128)
5180 NEXT I
5190 P=40321:POKE P-1,2:POKE P,1
5200 B=0:POKE 764,255
5210 SOUND 0,80,4,3
5400 RETURN
6000 REM Bang
6002 SOUND 0,0,0,0:SOUND 1,0,0,0:SOUND
 2,0,0,0
6005 FOR J=1 TO 3
6006 SOUND 0,INT(200*RND(1)),0,15
6008 FOR I=0 TO 10:NEXT I
6010 SETCOLOR 4,0,12
6020 FOR I=0 TO 10:NEXT I
6030 SETCOLOR 4,7,1
6035 NEXT J
6040 POKE P,8:POKE P-1,7
6050 FOR I=0 TO 1000:NEXT I
6055 SOUND 0,0,0,0
6060 FOR I=0 TO 20
6070 POSITION 0,I:PRINT #6;"
        ";:REM 20 spaces
6080 NEXT I
6090 IF S>H THEN H=S
6100 POSITION 3,0:PRINT #6;"best score
:";H
6120 POSITION 4,10:PRINT #6;"PRESS SPA
CE"
6130 POKE 764,255
6140 IF PEEK(764)<>33 THEN 6140
6160 FOR I=0 TO 20
6170 POSITION 0,I:PRINT #6;"
        ";:REM 20 spaces
6180 NEXT I
6200 RETURN
8000 REM Instructions
8005 H=0
8010 GRAPHICS 0:SETCOLOR 4,3,2:SETCOLO
R 2,0,9:SETCOLOR 1,0,0
8020 POSITION 10,1:PRINT "B O M B    R
 U N"
8030 ? :? "Your plane is running out o
f fuel and"
8035 ? :? "loosing altitude, but there
's nowhere":? :? "to land":? :?
8040 ? "The only solution is to flatte
n the"
8045 ? :? "deserted city below with yo
ur bombs."
8050 ? :? :? :? "Press the space bar T
O release a bomb"
8060 ? :? :? :? "Press the space bar t
o start...";
8090 POKE 764,255
8100 I=1:RESTORE 8600
8105 J=1:READ Q1,Q2,Q3,Q4,Q5
8106 IF Q1=0 THEN 8100
8110 IF I=1 THEN SOUND 0,Q1,10,7:SOUND
 1,Q2,10,3:SOUND 2,Q3,10,3
8120 IF I=5 THEN SOUND 0,Q4,10,7
8130 IF I=10 THEN SOUND 0,Q5,10,7
8140 I=I+1:IF I>15 THEN I=1:J=J+1
8150 IF PEEK(764)=33 THEN RETURN
8160 IF J=4 THEN 8105
8180 GOTO 8110
8600 DATA 72,217,173,53,45
8610 DATA 64,162,217,53,40
8620 DATA 57,144,230,47,35
8630 DATA 64,162,128,53,40
8640 DATA 0,0,0,0,0
9000 REM Graphics
9001 GRAPHICS 17:SETCOLOR 4,7,1:SETCOL
OR 0,2,10:SETCOLOR 1,0,14:SETCOLOR 2,9
,10:SETCOLOR 3,10,10
9002 POSITION 5,5:PRINT #6;"THINKING..
."
9010 SOUND 0,0,0,0:SOUND 1,0,0,0:SOUND
 2,0,0,0:SOUND 3,0,0,0
9050 FOR I=0 TO 1023
9060 POKE 16384+I,PEEK(57344+I)
9070 NEXT I
9080 RESTORE 9100
9100 DATA 0,192,209,253,15,31,253,33
9110 DATA 192,224,240,159,248,240,255,
128
9120 DATA 60,60,24,60,126,126,60,24
9130 DATA 254,146,146,254,254,146,146,
254
9140 DATA 16,16,56,124,254,170,170,254
9145 DATA 255,255,255,255,170,85,170,8
5
9146 DATA 6,4,9,147,244,168,112,48
9147 DATA 224,32,144,200,61,25,78,60
9150 FOR I=0 TO 63
9160 READ J:POKE 16392+I,J
9170 NEXT I
9300 POKE 756,64
9450 POSITION 5,5:PRINT #6;"
 "
9500 RETURN
```

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WE already know how skilled and creative Atari users are, and we look forward to receiving your programs and articles for publication in future issues of *Atari User*. However before you send your masterpiece off to us there are one or two points that you ought to bear in mind to make all our lives easier. We call them the seventeen commandments . . .

The Seventeen Commandments

WHILE not wanting to put programmers' creativity into a straightjacket we've found that life can be made a lot easier for the magazine, our readers and the programmers themselves if we stick to certain standards.

It has also occurred to us that it's no good our just knowing what we want, we have to tell you, our potential contributors. So here are our 17 commandments. Don't be too daunted by the list – it's mostly just commonsense and good programming practice.

● Send us your programs on tape or disc. There's no point in just sending a listing and asking if we're interested. You can't expect us to evaluate a program from merely reading a listing. We may be good, but we're not that good! A cassette or disc with the program on is a must.

We don't use two part programs in the magazine. Games in two files may look professional but they're the kiss of death as far as the magazine is concerned. Too much can go wrong when people type them in.

● Avoid variables names that lead to confusion such as I and 1, O and 0 and try to use meaningful variable names as well – ALIENS is far more understandable than AL.

● Tell us what the program is supposed to do and refer to it by name. You'd be amazed at the number of programs we get where the author forgets to tell us what it is all about.

In any subsequent correspondence, reference to "my program" can cause problems by its vagueness. Okay, we'd have the program on record somewhere, but life would be a lot easier all round if its author were less modest and admitted he was the genius behind "Mega-invaders".

● Label everything with both the program's name and your own name and address. And put the word ATARI on it somewhere. You won't appreciate the reason for this until you produce as many magazines as we do. Keep your own copy of it, too. So far the only existing copy of one particular classic game hasn't disappeared in the post – but there's no reason to run the risk of yours being the first.

If it's a game let us know how to "cheat" so we can test out the higher levels. We're getting on a bit here and our reactions aren't as good as they used to be. (Not that they were up to much when they were as good as they used to be . . .)

And an adventure-type game or whatnot should come with a map of the rooms and any other crib sheet you possess. Much as we'd like to, we just don't have time to guess the name of Rumplestiltskin's brother, no matter how much we admire your ingenuity. (Anyway he works in our artroom.)

● Put more than one copy of the program on your tape or disc. And if you want the cassette or disc back let us have a stamped addressed envelope with the name of the program on it.

You won't appreciate this unless you've run a computer magazine, but please send each different program on a different cassette or disc. If not, we just can't handle them. The rule is, one program per cassette or disc – though recorded several times on it.

● Let us have a printed listing if possible. Screen dumps or off-screen photos are much appreciated, though not vital. Diagrams are always of use. Often a point that's difficult to put into words becomes clear as crystal when you sketch it out.

● Give a description of the program, what it does, why you wrote it, and outline the way it works and its variables and subroutines.

If it's a game let us have a plot. You'll get an idea of the sort of thing we want by reading the introductions to one or two of our games.

Maybe you could also give a few ideas for its improvement or expansion. Even if you can't get your upgrades to work there's a good chance that someone among our very talented readers will.

Every subroutine ought to be titled clearly with a REM and should be referred to by it. Again, make the title meaningful. Also when you GOSUB use a REM to indicate which subroutine you're using. For example:

```
100 GOSUB 1000: REM Move man
.
.
.
.
1000 REM **** Move Man ****
.
.
1100 RETURN
```

At first this may seem to be far too much fuss, but it's not just for the readers' benefit. As your programs grow you'll find that such REMs more than repay the effort by allowing you to keep track of your work.

When you write out your list of subroutines (vital) try to do it in the form:

100 example Shows how we want . . .
200 delay Holds things up . . .

where the line numbers refer to the

lines where the subroutine is defined. Again, this helps by making things clearer to our readers – and you!

We don't expect your program descriptions to be classics of English literature, but it does help if they make sense and are easy to follow. Try reading them out loud – you'd be amazed how much such a simple technique can improve your writing.

Also if you get stuck to put something into words try this trick: tell someone what it is you're trying to put into words – then write it down. Before you reject this hint, try it – more than one professional writer owes his career to it.

● It is good practice to number your program, starting at 10 in increments of 10. This way a missing line stands out like a sore thumb.

● Make sure that the program actually works. Try it out on your friends for their criticism (painful though it may be). The acid test is to ask them to type it in. And – when you find yourself muttering through clenched teeth, "How could anyone be that stupid?" (the answer is "regularly") – cast out the mote in your own eye and alter your program to take account of the feedback.

It's not easy to do, as the all-too-frequent blood feuds among the editorial staff here testify, but it's worth it.

Instructions can make or break a game. Make sure that your's really do instruct. They should be complete and it helps if the spelling and grammar are correct. Apart from causing confusion, such errors also make programs look amateurish.

As well as misspellings, bad grammar, split words and general untidiness are all to be avoided.

Following even the simplest program can cause problems for the most experienced programmer – don't add to them unnecessarily.

● Please do put lots of nice explanatory REMs in your programs. A couple of REM statements with nothing after them at the beginning of the program gives us room to put in our messages without messing up all the line numbers you have referred to in your program description.

● Double space all your written matter. This means leaving a blank line between each line of text – it's vital from our point of view. Try to follow our style. We have our own ways of doing things. We talk about modes in general but Mode 1 in particular. We press the Return key, not the RETURN key as you might expect.

Just look how we do it in the magazine. Our programs are Program I, Program II, and so on, our diagrams Figure I, Figure II.

● Try to avoid long multiple lines if you can. Remember, people will be spending hours typing your programs into their micros, and long lines are harder to debug.

If you follow these rules when you submit a program you'll stand a better chance of having it published

● Please, when you send us your work, include a separate page telling us that it is your own work, it has not been offered elsewhere and we have your permission to print it. If you don't, we'll have to return it.

● It's always nice if a program can have an alternative key or joystick option.

● One of the major causes of programs crashing is because the user inputs something the programmer wasn't expecting. All right, the idiot shouldn't type in –999 when you ask him his age, but believe me, they will, out of sheer peversity – particularly if the program is educational. There is something about CAL programs that brings out the devil in us all . . .

So try out all the unlikely options – if you don't, some poor user will.

Actually it takes a lot of skill to idiot proof a program, as it's delicately known in the trade.

Often you're so involved in getting the program to work as it's supposed to that you just can't make the mental leap needed to see it as the passively malevolent reader does. So try it out on your friends!

● Another irritation for a reader is when he sees something like:

```
PRINT"      "
```

Exactly how many blanks is he supposed to enter?

Use:

```
PRINT"    ":REM 4 BLANKS
```

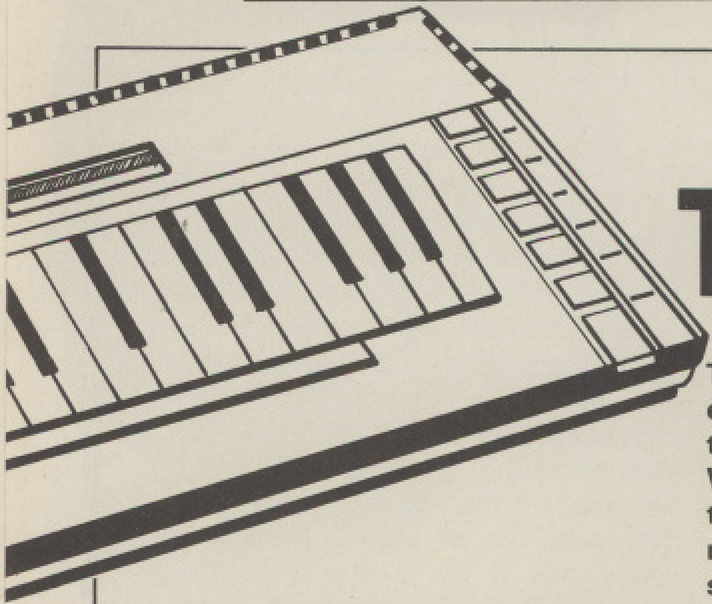
● Tell us who you are. We like to know your Christian name and also it's interesting to know your age and profession. After all, we might reject your program, but if we knew you were a fetlock fettler we'd have been able to send you Obscuresoft's "Fettling fetlocks on the Atari" for review.

Also a telephone number – both home and work – with the correct STD code is really useful, and can save a lot of time.

Thus endeth the 17 rules. If you follow these when you submit something to us you'll stand a much better chance of having it published. More importantly, you'll become a far more professional programmer.

And the better you become the more satisfying it is.

Contributions should be sent to: Features Editor, Atari User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.



Tickle the ivories . .

TURN your Atari into a simple electronic organ with this easy-to-enter Basic program from W.N. HOLTON. When you run it, the A to : keys become the white notes while W, E, T, Y, U, O and P supply the blacks.

In no time at all you'll be playing your own Atari masterpiece and, if you're feeling ambitious, you could even supply a graphics keyboard. Let's see (or is it hear?) your creations at *Atari User.* Sounds like it might be fun.

```
1 REM ATARI KEYBOARD
2 REM BY W.N.HOLTON
5 PRINT CHR$(125)
10 A=PEEK(764)
20 IF A=255 THEN 10
30 D=0
40 POKE 764,255
50 RESTORE 350
60 IF A=63 THEN N=120:GOTO 260
70 IF A=62 THEN N=108:GOTO 260
80 IF A=58 THEN N=96:GOTO 260
90 IF A=56 THEN N=91:GOTO 260
100 IF A=61 THEN N=81:GOTO 260
110 IF A=57 THEN N=72:GOTO 260
120 IF A=1 THEN N=64:GOTO 260
130 IF A=5 THEN N=60:GOTO 260
140 IF A=0 THEN N=53:GOTO 260
150 IF A=2 THEN N=47:GOTO 260
160 IF A=46 THEN N=114:GOTO 260
170 IF A=42 THEN N=102:GOTO 260
180 IF A=45 THEN N=85:GOTO 260
190 IF A=43 THEN N=76:GOTO 260
200 IF A=11 THEN N=68:GOTO 260
210 IF A=8 THEN N=57:GOTO 260
220 IF A=10 THEN N=50:GOTO 260
250 GOTO 10
260 READ X
270 SOUND 0,N,14,X
280 IF PEEK(764)<>255 THEN GOTO 10
290 D=D+1:IF D<48 THEN 260
300 POKE 764,255:GOTO 10
350 DATA 0,0,6,6,6,6,6,6,6,6,6,6,6,6
,6,6,6,6,5,5,5,5,5,5,5,5,5,5,4,4,4,4
,4,4,4,4,4,3,3,3,2,2,2,1,1,0
```

Atari DOS 2.5

BEFORE telling you about Atari's new DOS, let's first explain for cassette owners what DOS is. It stands for Disc Operating System, and its job is to handle the storage of information on disc.

When you store anything on cassette, you can just use CSAVE and CLOAD, and the computer will do the rest. So why the need for an extra DOS for disc drives?

The reason is one of memory. The disc handlers have lot a more work to do than the cassette handler, and therefore take up about 9k of memory.

Atari decided, quite reasonably, that owners who had only a cassette recorder would be more than a little upset at losing an extra 9k for something that they would never use. Thus, DOS is stored on disc, and will automatically load into the computer when you switch on.

Atari have released three versions of DOS so far, and a fourth is now available. DOS 1.0 took up 9k of memory, and was soon replaced by DOS 2.0. This has a core of 5k which loads into memory on power-up, and a menu taking up a further 4k, which only loads when you type "DOS".

DOS 2.0 has become the standard for all third-party DOS manufacturers, and was well established when Atari came along with the new 1050 drive and the all-new DOS 3.

This offered extra storage space, but was very poorly received because it was clumsy to use, incompatible with DOS 2.0 discs, and very wasteful of space. Even a spokesman from Atari admitted that it was "a bit of a dog".

Taking a long hard look at Atari's new operating system, ANDRE WILLEY reports that it's very friendly and makes the most of enhanced density's extra storage space

Thankfully, Atari have backed down, and called in Bill Wilkinson, of Optimized Systems Software, to write a revised version of DOS 2.0 to handle enhanced density.

OSS were responsible for the original Atari DOS, Basic and Assembler/Editor Cartridge, and have since upgraded these products themselves into the excellent DOS-XL, Basic-XL and Mac/65.

They have also released what I consider to be simply the best language available for the Atari – Action! Thus, the news that OSS were doing DOS 2.5 hit the Atari community in much the same way as the music world would take the news that the Beatles were re-forming.

I have been using a pre-release copy of DOS 2.5 for about a month now, and it seems to do all that's claimed for it. It is very user-friendly without being tedious to use, completely compatible with DOS 2.0, and capable of using the extra storage space of enhanced density. The main menu will prompt you with the following one-letter commands:

A. *Directory of files on disc.*
B. *Return to Basic (or cartridge).*
C. *Copy file(s) from one drive to another.*
D. *Delete file(s).*
E. *Rename file(s).*
F. *"Lock" file(s).*
G. *"Unlock" file(s).*
H. *Write DOS files to disc.*
I. *Initialise disc (format).*
J. *Make duplicate copy of a disc.*
K. *Save a block of memory (not Basic programs).*
L. *Re-load a saved memory block.*
M. *Run a machine code program.*
N. *Make a MEM.SAV file (see below).*
O. *Dupicate file(s) on single drive.*
P. *Format (single density only).*

DOS 2.0 owners will recognise all but the last option, though some of the others have been slightly altered. Drive density is automatically selected, which means that when you type I for Initialise disc, the computer will detect whether you have a drive capable of enhanced density, and format the disc accordingly.

Should you wish a disc to be formatted for later use on an old 810 drive option P will format a disc in single density regardless of the drive type. Whenever you load a formatted disc into a 1050 drive it will sense the type – so discs can be swapped about as you wish.

The duplicate disc option (J) will format the new disc before copying, thus ensuring an accurate copy, no matter what density the original was

recorded in.

One interesting point is that any files you create on an enhanced density disc which would be beyond the end of a DOS 2.0 single density disc will show up with < > brackets around the filename, meaning that they will be invisible on a DOS 2.0 directory.

Getting a directory (list of files) from your master disc will show the following:

*** DOS SYS 037**
*** DUP SYS 042**
*** RAMDISK COM 009**
*** SETUP COM 070**
*** COPY32 COM 056**
*** DISKFIX COM 057**
*** DOSMAN 019**
*** MINIMAN 147**
573 FREE SECTORS
(Or 270 FREE SECTORS in single density)

The asterisks before each filename indicate that all of the files are *"locked"*, which simply means that DOS will not allow you to delete them without first telling it to "unlock" them again.

The numbers after each name tell you how many sectors long that particular file is – one sector is the smallest length a file can be, and can contain up to 128 bytes. Thus, the file RAMDISK.COM takes up 1152 (or 9 times 128) bytes of disc space.

In enhanced density, a disc has a total of 1010 sectors available, which the directory shows as 999+, to ensure compatibility with DOS 2.0. In single density mode you will get the same amount of free space as with DOS 2.0 – 707 sectors.

The file DOS.SYS which, somewhat surprisingly, is two sectors shorter than on DOS 2.0 is the segment of DOS that loads on power-up, and DUP.SYS is the segment called up when you type "DOS".

This has the disadvantage that when you call DOS on either DOS 2.0, 2.5 or 3, your program will be lost. Therefore you must either SAVE your program before calling DOS, or put a MEM.SAV file on your disc – using menu option N – which will automatically save the program for you before DOS is called and restore it again afterwards.

The other files on the master disc are a series of useful utilities. The most interesting of these is RAMDISK.COM. This allows you to use the extra 64k RAM on the 130XE in the same way as you would normally use a second disc drive.

The advantage of this is that it is dozens of times faster than a disc drive, and with DUP.SYS and MEM.SAV set up on the RAMDISK (which is handled by RAMDISK.COM), calling DOS is virtually instant (see Table I).

You get a total of 499 sectors on this "disc", and it is perhaps the most powerful and useful feature of DOS 2.5. The catch – there's always one, isn't there? – is that the contents of RAM are lost when you switch off the computer, which means that you must always finish a session by copying anything that you want to keep back on to a real disc.

SETUP.COM allows you to change the system configuration – number of drives allowed, buffer areas, read-after-write verify mode and so on. It can also create an AUTORUN.SYS file for you, which will run a Basic program and/or set up the RS-232 handlers for modem use when you boot the disc.

COPY32.COM is a utility which will allow you to transfer files from a DOS 3 disc back on to DOS 2.5. It will allow you to view the directory of the DOS 3 disc first, and then choose which files to copy.

DISKFIX.COM is a handy little program which is designed to get you out of trouble if you do something silly to a disc. It is more than a little frustrating to find that, in a fit of temper, your little brother has just erased the last three months' work on your latest Space Invaders program. Thankfully, DISKFIX allows you to un-erase the file again – while you un-erase your brother.

On DOS 2.0 and 2.5, the rename option would allow you to give two files the same name. This was fine until you wanted to separate them again, and you found that if you tried to delete, rename, copy – or anything else – one file, then both would be affected. DISKFIX allows you to give both files different names again.

Another problem can occur if you Break out of a disc write, which can corrupt the VTOC Table. In plain English, DOS might not know how many free sectors the disc has, and even if you could only see a couple of files on the directory, DOS may show considerably fewer free sectors than it should – thus reducing the amount of data you can store.

DISKFIX will verify each file on the disc, check its length, and re-calculate the correct amount of space.

The last two files on the disc contain an AtariWriter document and a Basic program for those without a printer. These will print a copy of an 11-page "Mini-Manual" to DOS 2.5, giving details on general use, compatibility with other DOSs, and the use of the utility files.

The icing on the cake as far as this "Super-DOS" goes is that you can get it free. If you contact Atari's Help-Line (Monday-Saturday, during office hours, on 01-309 7770) they will give you the details of your

DOS TYPE	Initial Load time to Basic	co
DOS 1	15	
DOS 2	10	
DOS 2 with MEM.SAV	10	
DOS 3	12	
DOS 3 with MEM.SAV	12	
DOS 2.5	10	
DOS 2.5 with MEM.SAV	10	
DOS 2.5 (130XE) MEM.SAV in RAMDISK	18	L
DOS-XL	13	
DOS-XL with Basic-XL	24	

Table I: DOS Comparisons

nearest user group or retailer who will be able to put DOS 2.5 on to a blank disc for you.

Atari will NOT be selling it as such, and you will not be charged for it – though you can expect to be charged for the blank disc if you don't provide your own.

From this month Atari should have available a full 150-page manual giving far greater details of the more technical aspects, and this will cost in the region of £10-£12.

Any disc drives shipped from Atari after July will also contain DOS 2.5 and the full manual. However, if you've already got a disc drive, and you're currently using DOS 3, then you should think very seriously about shifting to 2.5 as soon as you can get your hands on a copy.

I've provided some comparisons between the various DOSs in Table I. In a future issue of *Atari User*, I'll begin a closer look at how DOS 2.0 and 2.5 work, and how they actually store information.

The icing on the cake is that you can get it free!

Time to load DOS commands	Time to return to Basic	Free memory from Basic (bytes)	Maximum disc capacity (formatted)	Disc capacity after main DOS file(s) written
0	0	28,814	90,752	82,560
7	0	32,274	90,496	80,128
32	9	32,274	90,496	74,368
6	0	32,274	130,048	119,808
12	8	32,274	130,048	114,688
7	0	32,418	129,280	119,168
32	9	32,418	129,280	113,408
Less than 1 sec.	Less than ½ sec.	32,274	129,280 +RAMDISK 63,872	118,016 +RAMDISK 52,736
0	0	30,990	90,496	84,608
0	0	37,134	90,496	78,720

All timings in seconds, with a 1050 drive running single density discs, on a 130XE. Disc capacity after main DOS files have been written, but NOT including various optional DOS files, enhancements, etc. Basic-XL and DOS-XL can use extra memory management to give much more user RAM. Normal free memory (no DOS) = 37,902 bytes.

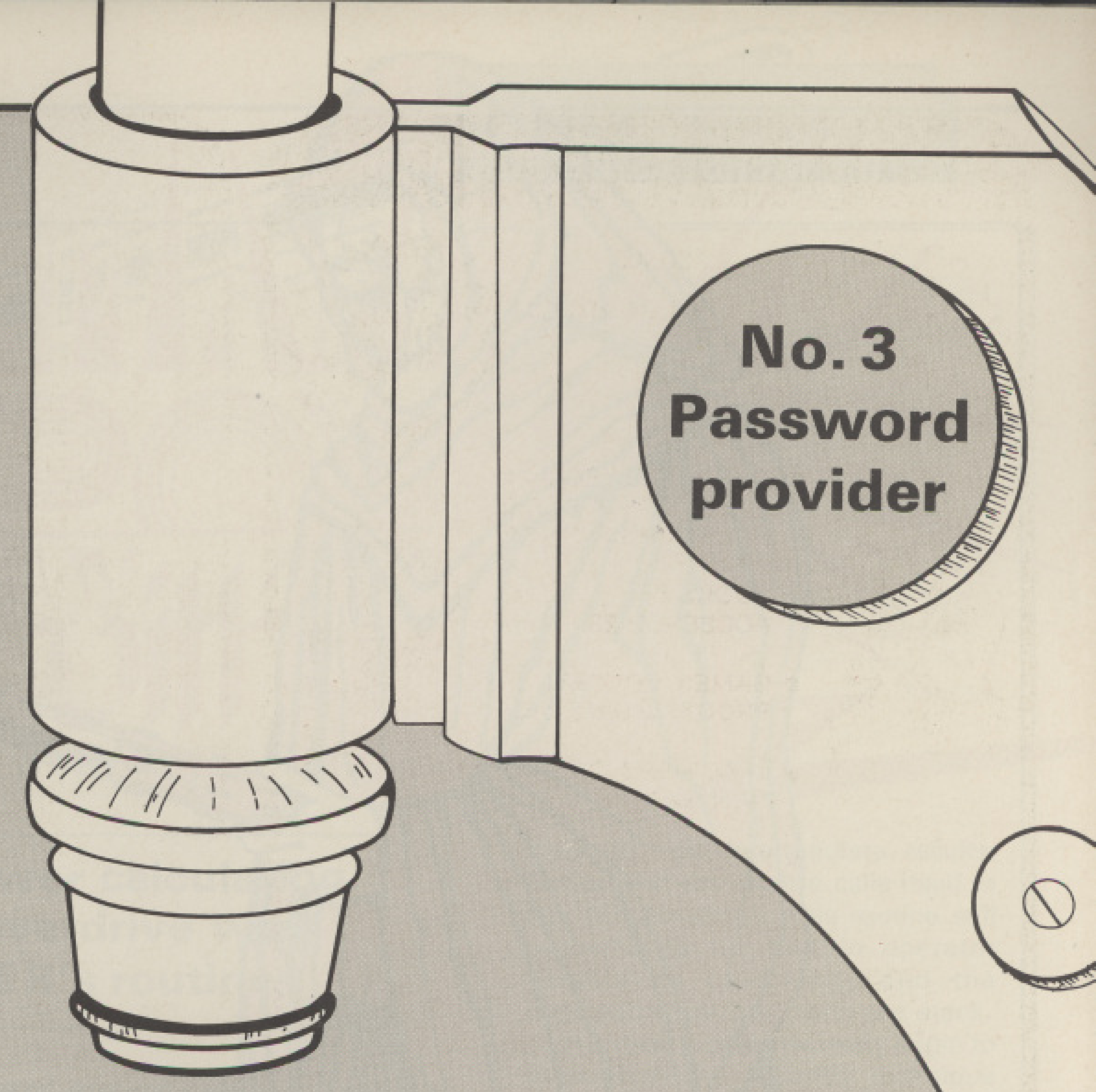
ONE of the first things you have to think of when you log onto Telecom Gold is a password. The trouble is that it's not easy thinking of one that's simple to remember yet hard for someone else to guess.

So this month we'll be looking at a program that uses the Atari's string handling capabilities to do our thinking for us.

```
10 REM PASSWORD GENERATOR
20 REM TREVOR ROBERTS
30 OPEN #1,4,0,"K"
40 DIM PASSWORD$(10):DIM SET$(26):DIM PICK$(1)
50 PRINT "How many letters";
60 INPUT NUMBER
70 IF NUMBER<0 OR NUMBER>10 THEN GOTO 50
80 SET$="ABCDEFGHIJKLMNOPQRSTUVWXYZ"
90 FOR LOOP=1 TO NUMBER
100 GOSUB 200
110 NEXT LOOP
120 PRINT :PRINT "ONE POSSIBILITY IS ";PASSWORD$
130 GOSUB 300
140 IF FINISH<>1 THEN GOTO 80
150 PRINT :PRINT "Your choice is ";PASSWORD$
160 END
200 REM PICKS ONE LETTER FROM SET$
210 PICK$=SET$(INT(RND(0)*26+1))
220 REM ADDS IT TO GROWING PASSWORD
230 PASSWORD$(LOOP)=PICK$
240 RETURN
300 REM KEYBOARD INPUT
310 PRINT :PRINT "DO YOU  LIKE THIS PASSWORD? ENTER Y/N"
320 GET #1,ANSWER:IF ANSWER<>89 AND ANSWER<>78 AND ANSWER<>121 AND ANSWER<>110 THEN GOTO 310
330 IF ANSWER=89 OR ANSWER=121 THEN FINISH=1
340 RETURN
```

Micro Scope

No. 3 Password provider



10,20 These are just REMs telling humans what the program is called and who wrote it.

30 Opens the keyboard up as a means of input while the program is running. We'll be using this in the subroutine that starts at line 300.

40 Dimensions three string arrays.

50,60 Ask for the number of letters you want in the password and store your reply in *NUMBER.*

70 An example of what's known as a mugtrap. Here the comparisons make sure that you don't want a password with either a negative number of letters or more than 10. If you do, you're asked again until you give a number that's in range.

80 Uses *SET$* to hold the letters that the password will be picked from. Here they are the alphabet. The more cryptically minded could use other selections of letters.

90-110 Make up a FOR . . . NEXT loop with control variable *LOOP.* This loop cycles once for every letter of the password, calling the subroutine at line 200 each time. The result is a potential password stored in *PASSWORD$.*

120 displays the putative password.

130 Calls the subroutine at line 300. This checks whether or not you like the password. If you don't the program produces another until you're satisfied.

140 If the flag variable *FINISH* is not equal to 1 then the GOTO sends the program back to pick another password. Notice that *FINISH* hasn't been previously assigned and so initially takes the value 0.

150 Displays your final choice.

160 The END stops the program crashing into the following subroutines.

200 The start of the subroutine is labelled with a REM for clarity.

210 This randomly slices off one letter from *SET$* and stores the result in *PICK$.*

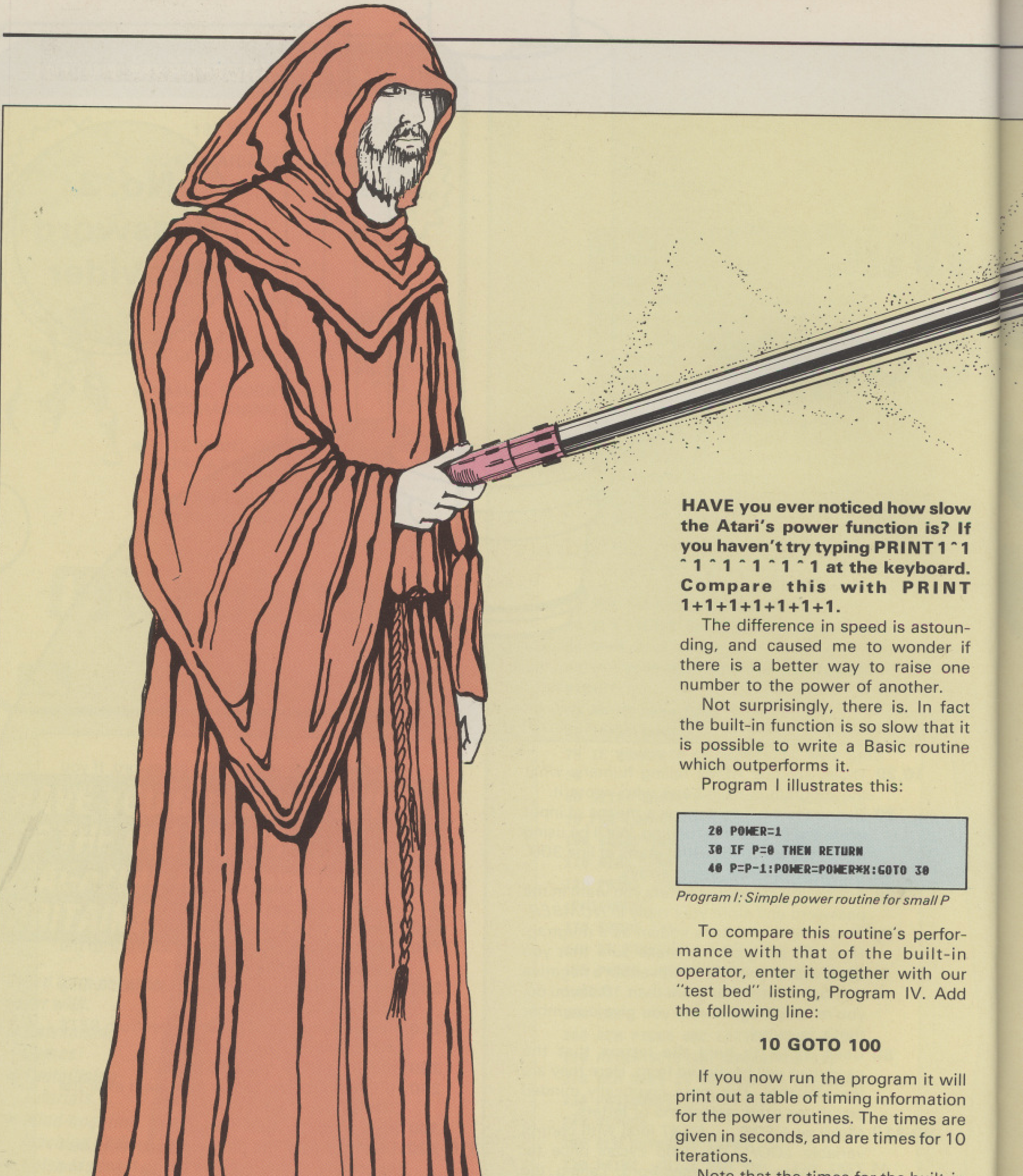
230 Adds this letter to *PASSWORD$.*

240 RETURNs control to the statement after the GOSUB.

300 Start of the keyboard routine.

310-320 Asks if you like the password and mugtraps the results. If the reply isn't Y, y, N or n the GOTO ensures that the user is asked again.

330 If the reply was Y or y the flag variable *FINISH* is set to 1. This means that the GOTO of line 140 will be ignored and the main loop will come to an end.



HAVE you ever noticed how slow the Atari's power function is? If you haven't try typing PRINT 1^1^1^1^1^1^1 at the keyboard. Compare this with PRINT 1+1+1+1+1+1+1.

The difference in speed is astounding, and caused me to wonder if there is a better way to raise one number to the power of another.

Not surprisingly, there is. In fact the built-in function is so slow that it is possible to write a Basic routine which outperforms it.

Program I illustrates this:

```
20 POWER=1
30 IF P=0 THEN RETURN
40 P=P-1:POWER=POWER*X:GOTO 30
```

Program I: Simple power routine for small P

To compare this routine's performance with that of the built-in operator, enter it together with our "test bed" listing, Program IV. Add the following line:

10 GOTO 100

If you now run the program it will print out a table of timing information for the power routines. The times are given in seconds, and are times for 10 iterations.

Note that the times for the built-in function remain fairly constant regardless of the power to which the number is being raised, while the times for the Basic subroutine increase as the power increases.

When the power reaches 14 the built-in operator begins to outperform the subroutine. If you want to try the subroutine out or use it in your programs, it is used as follows. To raise *X* to the power *P* let X=number: P=power: GOSUB 20: X=POWER

The POWER be with you

Put your Atari's power calculating capabilities into overdrive with FRANK O'DWYER's routines

where *X* is the number to be raised
P is the power to which it is to be raised
POWER is the answer returned by the subroutine at line 20.

Note that *P* must be a positive integer – 0, 1, 2, 3, 4, 5 and so on.

It is possible to improve upon the performance of the simple routine in Program I by using a squaring technique as follows:

To raise X to the power of 8, write $X = ((X^2)^2)^2$

To raise X to the power of 5, write $X = ((X^2)^2)X$

The routine given as Program II applies this technique, and outperforms the built-in function for most medium powers *P*. Combine Program II along with Program IV and the line 10 shown above as before to obtain timing information.

```
20 IF P=0 THEN POWER=1:RETURN
30 POWER=X:BIT=1
40 IF BIT+BIT>P THEN 60
50 BIT=BIT+BIT:POWER=POWER*POWER:GOTO
40
60 IF BIT=P THEN RETURN
70 BIT=BIT+1:POWER=POWER*X:GOTO 60
```

Program II: Fast power routine for small to medium P

Note how the squaring technique leads to an improvement in performance for powers of 16 and 32. In fact performance will be best at powers of 0, 1, 2, 4, 8, 16, 32, 64 and so on, and will steadily deteriorate as powers increase.

Note also that for some powers, the built-in function outperforms the subroutine. This is not important, since on average powers will be small and the subroutine will outperform the built in operator, again on average.

This routine is a good all-round performer, and works equally well for small powers of *P*, as it does for medium powers up to about 24.

A further improvement can be made to the squaring technique by applying it in recursive fashion. To compute X^{15}:

Step 1: Compute X^8
Step 2: Compute X^4
Step 3: Compute X^2
Step 4: Compute product of above results, and multiply by X.

```
10 DIM STACK(12):GOTO 100
20 SP=0:IF P=0 THEN POWER=1:RETURN
30 POWER=X:BIT=1
40 IF BIT+BIT>P THEN 60
50 BIT=BIT+BIT:POWER=POWER*POWER:GOTO
40
60 P=P-BIT:IF P>1 THEN STACK(SP)=POWER
:SP=SP+1:GOSUB 30:SP=SP-1:POWER=POWER*
STACK(SP):RETURN
70 IF P=1 THEN POWER=POWER*X:RETURN
80 RETURN
```

Program III: Recursive power routine for large P

Program III gives a subroutine to implement this technique, using a stack to hold intermediate results. Notice that the routine calls itself in line 60. Amazingly, this routine still outperforms the built-in operator despite its complexity and the overhead associated with the stack.

However it does not really begin to outperform the squaring technique until powers of 32 and above are reached. This routine is therefore the best one to use if high values of *P* are anticipated. Again, combine Program III with Program IV to obtain timing information.

```
100 PRINT "POWER","^TIME","GOSUB TIME"
:PRINT :FOR PP=10 TO 32:PRINT PP,
110 FOR T=18 TO 20:POKE T,0:NEXT T:REM
 RESET TIMER
120 FOR N=1 TO 10:X=1.01^PP:NEXT N:REM
 10 ITERATIONS OF BASIC POWER
130 T=(PEEK(20)+PEEK(19)*256+PEEK(18)*
65536)/50:PRINT T,
140 FOR T=18 TO 20:POKE T,0:NEXT T
150 FOR N=1 TO 10:P=PP:X=1.01:GOSUB 20
:X=POWER:NEXT N:REM 10 ITERATIONS OF S
UBROUTINE POWER
160 T=(PEEK(20)+256*PEEK(19)+65536*PEE
K(18))/50:PRINT T
170 NEXT PP
180 END
```

Program IV: Comparison routine for power subroutines

A useful benefit of each of these subroutines is that apart from increased speed they also bring increased accuracy in comparison to the built-in operator.

Try typing PRINT 2^2 at the keyboard. On some machines the answer given is 3.99999996 instead of 4. The subroutines I give do not suffer from this problem.

Now can anyone come up with routines which work for negative values of power and fractional values, for example X to the power of 2.2?

MIKE BIBBY continues his explanation of the fundamentals of the Atari's workings

Hexadecimallys you get two nyb out of every byt

AS we have mentioned in previous articles, the Atari – and all other machines based on the 6502 microprocessor – handles its binary numbers in groups of eight bits at a time. Such a group of eight is called a byte.

However, while handling eight bits at a time is satisfactory from the machine's point of view, from the human side of things it's rather difficult to manage. Those 1s and 0s are far too prone to error. Look at Table I for instance. It contains an error – can you find it?

It's all too easy to slip up when handling binary numbers – a single 1 in the wrong place and all is lost! To make things easier to deal with, when I am copying out binary numbers I put a wavy line between bits 3 and 4 to split the byte into two equal groups of four.

For example, if I were copying:

% 10001111(= 1 4 3)

I would write:

% 1000≀1111

Actually, splitting the byte into two groups of four bits is standard practice – each group of four bits is called a "nybble", would you believe?

It's not too hard to see that the biggest number you can represent in a nybble is 15, and the smallest is 0,

%1111 and **% 0000**

respectively. After all, you've only got four bits to play with!

So we can split up our byte into two nybbles of four bits each. Now when we split up a binary number in this manner we call the left-hand nybble the most significant nybble (MSN) and the right-hand nybble the least significant nybble (LSN).

We have already created one new number system – the binary system.

%10111011 = 187
%10101101 = 173
%10001111 = 151
%11110110 = 246

Table I

Let's design another one that combines the advantages of the denary system with those of the binary. That is, it will be easy to read and write, yet will still allow us to perceive the binary manner in which the machine handles things.

The system we want is called hexadecimal. This consists of using our standard digits 0 to 9 for the numbers zero to nine respectively, and the letter A to F for the numbers 10 to 15. In this way it allows us to code the numbers available in a nybble (that is, 0 to 15) with just one digit. This digit will be in the range 0 to 9 or A to F.

It may take a while to adjust to the idea of using letters of the alphabet for numbers, but it soon becomes second nature. You just have to get used to counting:

0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

Remember, there are B people in a cricket team, D in a rugby league team and F in a rugby union team. There are C months in a year, and E days in a fortnight.

Now just as we prefix all our binary numbers with %, we prefix our hexadecimal numbers with $, to avoid confusion. So $F means 15, while $9 means 9.

Studying Table II will really pay dividends – I suggest you practise writing down bit patterns of nybbles and their hexadecimal equivalents until it becomes second nature.

Given that we can encode a nybble in one hexadecimal digit, and that a byte consists of two nybbles, it should readily be apparent that we can encode a byte as two hexadecimal digits side by side, for example:

%1010 1001

%1010 → **$A**

%1001 → **$9**

→ **$A9**

That is:

%10101001 = $A9 = 169

You just split the byte up into two

Decimal	*Binary*	*Hexadecimal*
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Table II

y speaking, ybbles yte

nybbles – a left hand and a right hand nybble, encode each as a hexadecimal number, then put the two side by side.

You can go from hexadecimal to binary just as easily:

$8D
%1000 %1101
1000 1101

That is:

$8D = % 10001101 = 141

Although you have probably never thought of it in these terms, you are well aware that the value a digit represents depends on the column it is in. The number 230 is not as large as 320, though both numbers contain the same digits.

In hexadecimal coding too the column a digit is in is important. For example, $10 is far greater than $01. In binary each column is worth twice the preceding one. In denary, our usual number system, each column is worth 10 times the preceding one. In hexadecimal, each column is worth 16 times the preceding one.

Believe it or not, the columns in a four digit hexadecimal number, from greatest to least, are worth 4096, 256, 16 and 1 respectively.

This means that:

$ 1101 = 4096 + 256 + 1 = 4353

For the moment let's concentrate on the two digit, that is, two column, hexadecimal number, as these are all we need to store our bytes in. In this case the left-hand column is the "sixteens" column, the right hand the units column.

So:

16 1
$ 2 1 = 2*16+1 = 33
16 1
$ 2 D = 2*16+13 = 45
16 1
$ 8 0 = 8*16+0 = 128
16 1
$ C 0 = 12*16+0 = 192

To translate a two digit hexadecimal number into denary simply multiply the number in the left-hand column by 16 and add it to the number in the right-hand column – remembering to translate A to F if necessary.

The second column has the value 16 since the first column can only handle numbers up to 15 ($F) – the largest you can fit into a nybble (%1111). After 15, you *have* to use a second column for 16, that is $10.

Just as in denary, we "carry" at 10 since the largest value our columns can handle is 9, so in hexadecimal we carry at 16, since the largest our columns can handle is 15 ($F).

It is the fact that we carry at 16 that gives this number system its name "hexadecimal" – here "hex" stands for 6, "decimal" for ten. "Hexadecimal" = 6 + 10 = 16.

Given a second column $10, as we have seen is 16, 17 will be $11, while $12 is 18 and so on until we reach 31, which is $1F.

We have then run out of legal digits for the units column, so if we want to go on to 32 we had better give ourselves another 16, and set the units column back to zero, that is $20.

Another way of looking at the second column is that it comes from the most significant nybble. To turn the least significant nybble into the most significant nybble, we have to shift it over to the left four times.

If you cast your mind back to last month, this is equivalent to multiplying it by two four times in succession, that is 2×2×2×2=16. This is why a hexadecimal digit representing the most significant nybble is 16 times larger than the same digit representing the least significant nybble.

The largest number you can store in a two-digit hexadecimal number is $FF = 15×16+15=255. This is, of course, the same as the largest number we could store in a binary byte – we often refer to a two digit hexadecimal number simply as a byte.

To obtain the hexadecimal equivalent of a postive integer (whole number) less than 256, we divide it by 16. The quotient is the left hand digit, the remainder the right hand, translating into A to F where necessary.

For example:

174÷16=10 R 14

That is:

$A R $E

Hence **174=$AE**

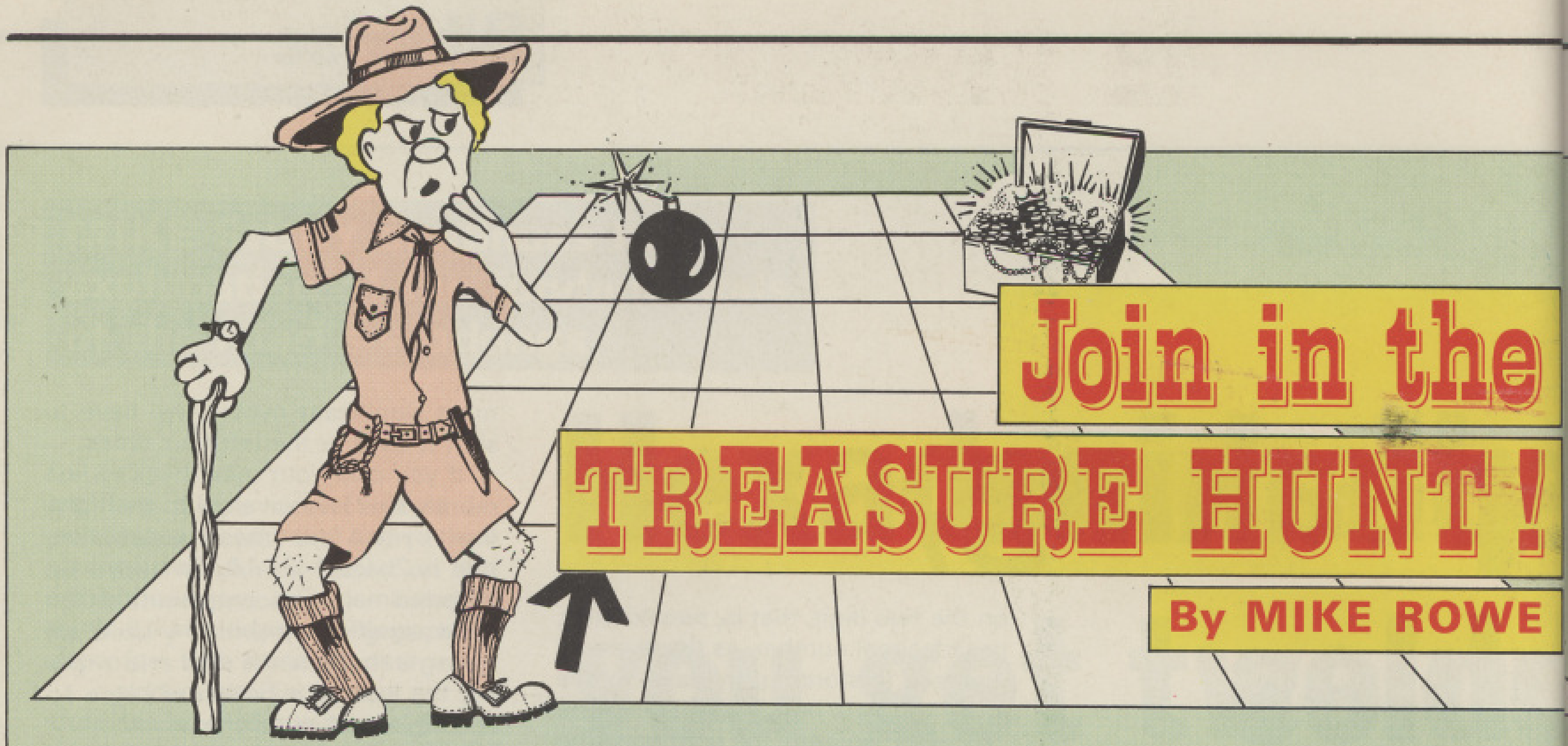
Anyway, here's a program that will convert from denary to hexadecimal for you. The workings shouldn't be too hard to follow.

Once you've understood it, how about writing one that will convert from hexadecimal to denary?

● *That's all for now. Next month we'll be looking at ways of combining binary numbers.*

```
10 REM DENARY TO HEX
20 DIM HEX$(16),ANSWER$(2)
30 HEX$="0123456789ABCDEF"
40 PRINT "DENARY ( 0 - 255 )";
50 INPUT NUMBER
60 IF NUMBER<>INT(NUMBER) OR NUMBER<0
OR NUMBER>255 THEN GOTO 40
70 HI=INT(NUMBER/16)
80 LO=NUMBER-HI*16
90 ANSWER$=HEX$(HI+1)
100 ANSWER$(2)=HEX$(LO+1)
110 PRINT ANSWER$
120 PRINT
130 GOTO 40
```

Program I



Join in the TREASURE HUNT!

By MIKE ROWE

THIS is a game of logic, the object of which is to find the treasure hidden in a matrix of squares in as few moves as possible.

The game is controlled by a joystick in port 1. This moves the man around the playfield searching for the treasure. A square can be interrogated by pressing the fire button and may contain one of five items:

1 – Nothing!
2 – An arrow
3 – A number
4 – A bomb
5 – The treasure!

An arrow indicates the direction of the treasure from your current position. A number shows the number of columns or rows away from your position.

If an X appears, then the treasure is more than nine rows AND columns away from you.

If you find a bomb it will explode and move the treasure to a new position and all your previous clues will be invalid.

A square containing a ? will always contain an arrow clue. However it also has a high risk of containing a bomb, so should be used carefully.

Each square always gives the same type of clue in any one game, but may give two different answers on subsequent interrogation. This is because it may tell you that the treasure is, for example, two columns or four rows away – but you will not know which is which.

The answer displayed is random each time.

Each time a square is interrogated your score is increased by one until the treasure is found. The object is to score as low as possible and the lowest score is saved until the game is stopped.

Although seemingly complicated, the game is actually very logical and easy to follow.

```
0 REM TREASURE HUNT
1 REM BY Mike Rowe 1985
5 DIM S(18,20):HIGH=999
10 GRAPHICS 1+16:DL=PEEK(560)+PEEK(561)*256:POKE DL+3,71
20 POSITION 0,0:? #6;" + treasure  hunt +"
25 SETCOLOR 2,11,6:SETCOLOR 0,15,10:SETCOLOR 1,9,8:SETCOLOR 3,3,10
30 FOR I=1 TO 20:? #6;" !!!!!!!!!!!!!!!!!!":NEXT I:REM All ! in inverse
35 ? #6:? #6;"  by   mike  rowe "
40 GOSUB 1000
50 GOSUB 2000
60 POSITION 0,22:? #6;"ATTEMPTS ";SCORE;"            "
100 S=STICK(0):DX=0:DY=0:IF STRIG(0)=0 THEN GOSUB 500
105 IF S=15 THEN 100
107 SOUND 0,200,8,10:FOR J=1 TO 20:NEXT J:SOUND 0,0,0,0
110 IF S=6 OR S=10 OR S=14 THEN DY=-1:MAN=138
120 IF S=5 OR S=9 OR S=13 THEN DY=1:MAN=138
130 IF S<8 THEN DX=1:MAN=137
140 IF S>8 AND S<12 THEN DX=-1:MAN=136
150 X1=X+DX:IF X1=0 OR X1=19 THEN X1=X
160 Y1=Y+DY:IF Y1=0 OR Y1=21 THEN Y1=Y
170 POSITION X,Y:? #6;CHR$(OLD):LOCATE X1,Y1,OLD:POSITION X1,Y1:? #6;CHR$(MAN)
190 X=X1:Y=Y1:GOTO 100
500 REM SEARCH SQUARE
505 SCORE=SCORE+1:POSITION 9,22:? #6;SCORE
510 POSITION X,Y:GOTO 520+S(X,Y)*10
520 ? #6;" "
529 GOTO 580
530 IF ABS(TX-X)>9 OR ABS(TY-Y)>9 THEN ? #6;"X":GOTO 580
535 IF RND(0)<0.5 THEN ? #6;ABS(TX-X):GOTO 580
539 ? #6;ABS(TY-Y):GOTO 580
540 IF RND(0)<0.5 AND TY<>Y THEN 545
541 IF TX=X THEN 545
542 IF TX<X THEN ? #6;CHR$(133)
543 IF TX>X THEN ? #6;CHR$(134)
544 GOTO 580

545 IF TY<Y THEN ? #6;CHR$(131)
546 IF TY>Y THEN ? #6;CHR$(132)
549 GOTO 580
550 IF RND(0)>0.2 THEN 540
555 GOTO 600
560 ? #6;"+"
569 GOTO 800
570 GOTO 600
580 FOR I=255 TO 50 STEP -5:SOUND 0,I,10,10:NEXT I:SOUND 0,0,0,0
585 RETURN
600 REM BOMB
610 POSITION X,Y:? #6;CHR$(140)
620 POSITION 0,21:? #6;"BOMB MOVES TREASURE"
630 GOSUB 3000
640 POSITION X,Y:? #6;CHR$(141)
650 GOSUB 3000
660 POSITION X,Y:? #6;CHR$(142)
670 GOSUB 3000
680 POSITION X,Y:? #6;" "
690 IF STICK(0)=15 THEN 690
695 S(TX,TY)=0:POSITION 0,21:? #6;"                    "
696 TX=INT(RND(0)*18+1):TY=INT(RND(0)*20+1):IF S(TX,TY)=3 THEN 696
697 S(TX,TY)=4
699 RETURN
800 REM TREASURE FOUND
810 POSITION 0,21:? #6;"treasure found ":? #6:? #6;"previous best ";HIGH
820 IF SCORE<HIGH THEN HIGH=SCORE
830 RESTORE 900
840 READ A,B,J:IF A=-1 THEN 860
```

VARIABLES

S(n,n)	Matrix of treasure map.	**DX,DY**	Amount of movement.
DL	Start of display list.	**TX,TY**	Position of treasure.
S	Joystick position.	**CHSET**	Location of start of internal character set.
X,Y	Old position of man.	**RAMTOP**	Top of memory.
X1,Y1	New position of man.	**CH**	Location of new character set.

PROGRAM MAP

10	Sets up graphics. Change Line 1 to Graphics 2.
25	Sets colours.
100-190	Main movement routine.
100-140	Read stick and trigger.
107	Sound of man moving.
150-160	Calculate new position.
170	Saves contents of square and moves man.
190	And again!
500-585	If button pressed search square.
505	Increment attempts.
510	Go to relevent line depending on type of square.
520	Empty square.
530	Number square.
540	Arrow square.
550	? square.
560	Treasure!
600-660	Bomb routine.
696	New position for treasure.
800-906	Treasure found routine.
830-850	Music playing routine.
900-906	Music data.
1000-2100	Initialise.
1010	Calculates new memory location for redefined characters.
1020	Reads redefined characters.
1030	Moves part of old character set to RAM.
1100-1140	Character data.
2010	Prevents screen colour from cycling.
2020-2070	Random calculation of position of each type of square.
3000	Explosion sound routine.

```
850 SOUND 0,A,10,10:SOUND 1,B,10,8:FOR
 I=1 TO J*20:NEXT I:SOUND 0,0,0,0:SOUN
D 1,0,0,0:GOTO 840
860 IF STRIG(0)=1 THEN 860
870 GOTO 10
900 DATA 121,193,2,60,182,4,60,144,4,6
8,121,2,76,121,4,81,121,4,91,182,4,91,
144,6,91,0,3,102,0,1,91,144,4
901 DATA 121,144,4,102,144,2,91,144,4,
91,144,14,0,204,2,91,182,2
902 DATA 60,182,4,60,144,4,68,121,2,76
,121,4,81,121,4,91,182,4,91,144,6,91,0
,3,102,0,1,91,144,4
903 DATA 121,144,4,102,144,2,91,144,4,
91,144,14,0,204,2,91,182,2
904 DATA 60,243,4,60,136,4,60,96,4,60,
96,4,0,136,2,68,136,4,76,153,2,68,108,
2,76,108,4,121,0,2
905 DATA 60,136,3,60,136,1,60,153,4,68
,153,2,76,153,4,91,144,18
906 DATA -1,-1,-1
1000 REM CHARACTER SET
1010 CHSET=57344:RAMTOP=PEEK(106):CH=R
AMTOP-8:CHBASE=CH*256:POKE 756,CH
1015 IF PEEK(CHBASE+8)=255 THEN RETURN

1020 RESTORE 1100:FOR I=CHBASE+8 TO CH
BASE+119:READ A:POKE I,A:NEXT I
1030 FOR I=120 TO 471:POKE CHBASE+I,PE
EK(CHSET+I):NEXT I
1050 RETURN
1100 DATA 255,129,129,129,129,129,129,
255,0,102,102,102,0,0,0,0,0,24,60,126,
24,24,24,0
1110 DATA 0,24,24,24,126,60,24,0,0,16,
48,126,126,48,16,0,0,8,12,126,126,12,8
,0
1120 DATA 255,195,217,243,231,255,231,
255,24,24,8,24,56,88,8,24,24,24,16,24,
28,26,16,24
1130 DATA 24,24,0,60,90,24,24,60,0,31,
62,65,255,155,131,254,4,8,16,24,60,126
,126,60
1140 DATA 0,130,84,40,84,40,84,130,0,4
0,68,130,0,130,68,40
2000 REM INITIALISE VALUES
2010 POKE 77,0
2020 FOR I=1 TO 18:FOR J=1 TO 20:S(I,J
)=0:NEXT J:NEXT I
2030 FOR I=1 TO 70:X=INT(RND(0)*18+1):
Y=INT(RND(0)*20+1):S(X,Y)=1:NEXT I
2035 FOR I=1 TO 10:X=INT(RND(0)*18+1):
Y=INT(RND(0)*20+1):S(X,Y)=5:NEXT I
2040 FOR I=1 TO 50:X=INT(RND(0)*18+1):
Y=INT(RND(0)*20+1):S(X,Y)=2:NEXT I
2050 FOR I=1 TO 20:X=INT(RND(0)*18+1):
Y=INT(RND(0)*20+1):S(X,Y)=3:POSITION X
,Y:? #6;CHR$(39+128):NEXT I
2060 X=INT(RND(0)*18+1):Y=INT(RND(0)*2
0+1):S(X,Y)=4:POSITION X,Y:? #6;CHR$(3
3+128):TX=X:TY=Y
2070 X=1:Y=1:LOCATE X,Y,OLD:POSITION X
,Y:? #6;CHR$(42+96)
2080 SCORE=0
2100 RETURN
3000 FOR I=0 TO 255 STEP 5:SETCOLOR 3,
I/16,12:SOUND 0,I,8,10:NEXT I:SOUND 0,
0,0,0:SETCOLOR 3,3,10:RETURN
```

The great adventure has begun...

WHEN we launched MicroLink we naturally expected it to generate quite a large degree of interest among micro enthusiasts. What we didn't expect was what actually happened – a stampede of applications to join.

They poured in from all parts of Britain, and even more surprisingly from places as far away as Tasmania.

What has attracted them to MicroLink?

For the computer buff it's the thought of joining one big family of like-minded enthusiasts. Through the Chat facility he can "talk" in real time to people who are using the same micro as himself, discussing common problems and sharing hints and tips.

And as MicroLink is part of Telecom Gold and Dialcom – the largest electronic mail service in the world – he can also communicate speedily and cheaply with other enthusiasts in many other countries.

For the businessman, MicroLink immediately provides an office tool that he might not have been able to afford before. At his fingertips are the same facilities that are enjoyed by every leading British business – all of whom are subscribers to Telecom Gold.

For a once-only payment of £10 he can turn his micro into a telex machine – which normally would cost him £2,000. He can send a telex message for as little as 5.5p, and even that is reduced by 10 per cent if he defers transmission until after 8pm!

His micro can also become a terminal to the Telecom Gold computer, able to tap its tremendous power and versatility and to use giant number-crunching programs that can only be run on a mainframe.

No longer need he be tied to his office. He can use his micro from home – or golf club. And if he's not too confident about his spelling he can run his letter or telex message through the sophisticated Spell program before sending it off.

One of the many advantages of an online service like MicroLink is its flexibility – its ability to cope quickly with changing needs.

Although it is only a few weeks old, new sections are being continually introduced to provide users with an even more comprehensive service. Among the latest are a definitive guide to all UK bulletin boards, which can be updated daily as new boards open up, or phone numbers or hours of access change.

And there's a review of the computer magazines, so you can see what subjects are being covered in their current issues.

Finally, why should the Tasmanians, of all people, want to join MicroLink? As they live right on the other side of the world, won't it cost a fortune to communicate with the UK?

Not so. Because Tasmania is part of the international PSS network, instead of paying the normal telephone call rate of 96p a minute, they can call MicroLink over PSS for just 10p a minute.

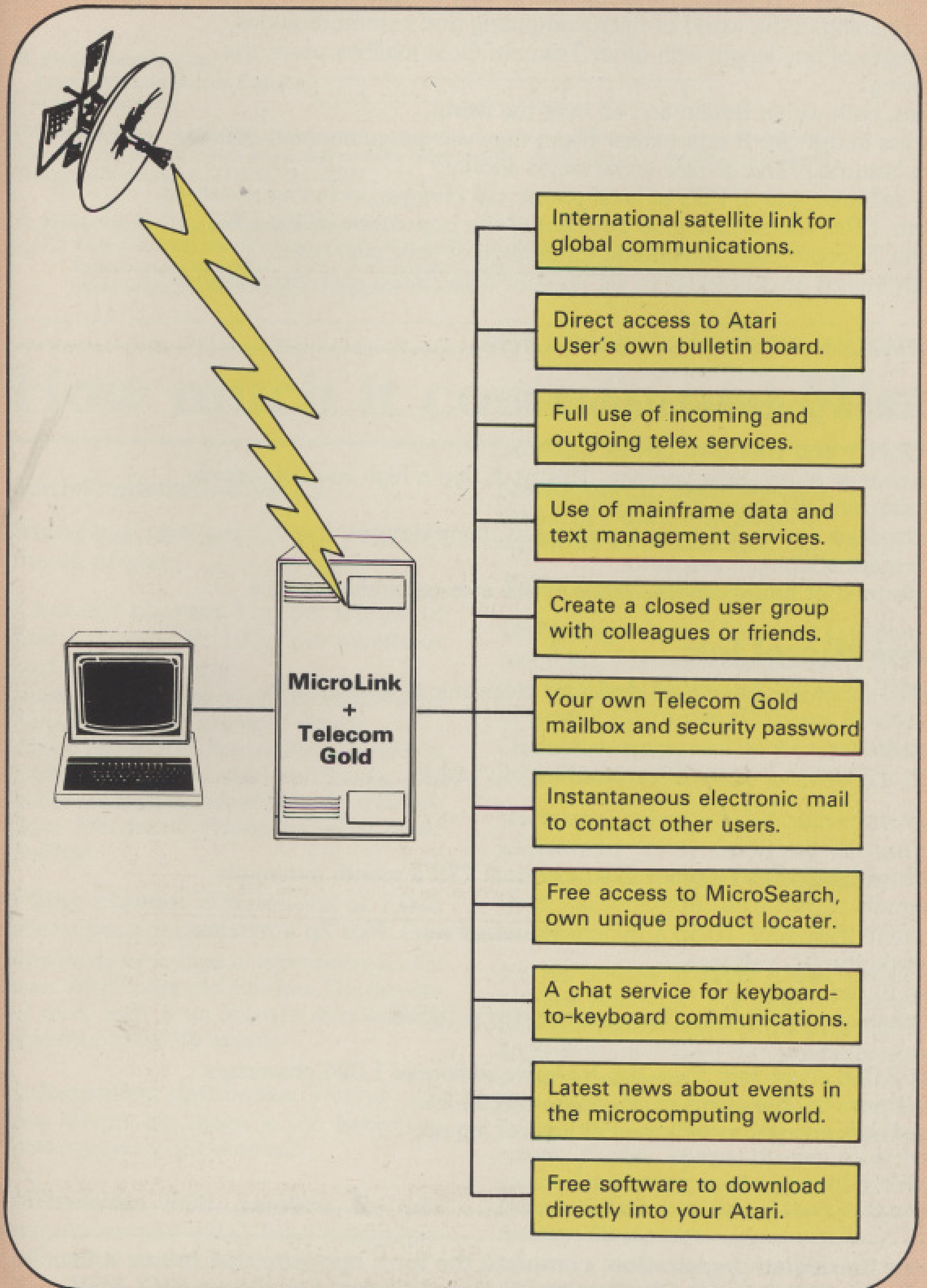
For callers in Europe it's even cheaper – just 2.2p a minute. With incentives like this, we expect MicroLink to grow into a truly international service.

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MicroLink is this year's most exciting – as well as most ambitious – development in the rapidly-expanding world of telecomputing.

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The result is an international communications link that is your passport to new realms waiting to be explored, new experiences to be shared with kindred spirits who enjoy telecomputing just as much as you do yourself.

Communicating the MicroLink way is ultra-fast – and much cheaper than you might expect. Wherever you live, you get direct access to the Telecom Gold computer at local call rates.

With your own electronic mailbox you can send a message to one destination – or to 500! – for less than you would pay for a first class stamp.

You can send and receive telex messages worldwide, or have a two-way chat with other users in real time.

And the cost of using MicroLink? Just £3 a month. Plus small additional access charges as detailed overleaf.

Join MicroLink now – and let you and your Atari be in the forefront of the new revolution in communications!

These are some of the innovative features you'll be able to use when you join . . .

MicroLink

What facilities you can use – directly from your micro:

- Access at any hour of the day or night to Microsearch, our exclusive product locater, which is constantly updated by Britain's major distributors. Powerful, easy-to-use keyword searching means you should find what you want within seconds.
- Direct contact, via electronic mail, with other users throughout the world. And because you're connected via PSS, and not the normal phone links, it's usually much, much cheaper.
- Full use of the closed user group bulletin board – with a special section for Atari users.
- Full service of news about new products and events. All presented in easy-to-read form to keep you right up to date with what is happening in the world of microcomputing and communications.
- Send and receive mailbox messages of any length with other Telecom Gold mailbox users, the number of which is rapidly growing.
- Send and receive telex messages, both within Britain and all over the world.
- Send telemessages to any address in the UK. If sent before 10pm they will get guaranteed delivery the next working day, including Saturday *(This service commences shortly.)*
- If you live outside the 01- local call area, use of PSS at local phone call charges, including access to the international Dialcom system. *(This covers nearly 90 per cent of the population of the UK.)*
- Use, should you require it, of the Telecom Gold mainframe for storage of your own data.
- Encouragement to combine with friends or colleagues to set up your own closed user group within MicroLink.
- Provision of free telesoftware, which you can download into your Atari.

What you will receive when you join MicroLink:

- Free registration on Telecom Gold – and your own private mailbox.
- Free password, which you can change at any time you like. This gives you a high level of security in order to preserve confidentiality, and is known only to you.
- Free instructional manual to introduce you to Telecom Gold and its many services.
- Free Help facility should you require additional assistance.
- Free newsletter to keep you informed of future developments in this ever-expanding service.

What you need to access MicroLink:

- Any personal computer, portable computer, hand-held device or electronic typewriter with communications facilities.
- Appropriate communications software.
- Modem (you can use 300/300, 1200/75 or 1200/1200 baud as you wish).

What will it cost?

- Monthly standing charge of £3 (compared to Telecom Gold's normal £10 a month minimum charge).
- Connect charges: 3.5p a minute (cheap rate); 10.5p a minute (standard rate). Plus 2p a minute PSS charge if calling from outside the 01- call area.
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- Outgoing telex: 5.5p per 100 characters (UK), 11p (Europe) and 16.5p (USA).
- Incoming telex: 50p.
- International mail: 30p for first 2,048 characters, then 15p for each additional 1,024 characters.
- Telemessages: £1.25 for a maximum of 350 words or 35 single spaced lines.
- On-line databases on Telecom Gold: charges as indicated at time of log-on.

To secure your immediate registration, complete the form opposite and return it to: MicroLink, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

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Europa House
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Hazel Grove
Stockport SK7 5NY.

FOR OFFICE USE ONLY:
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AT7

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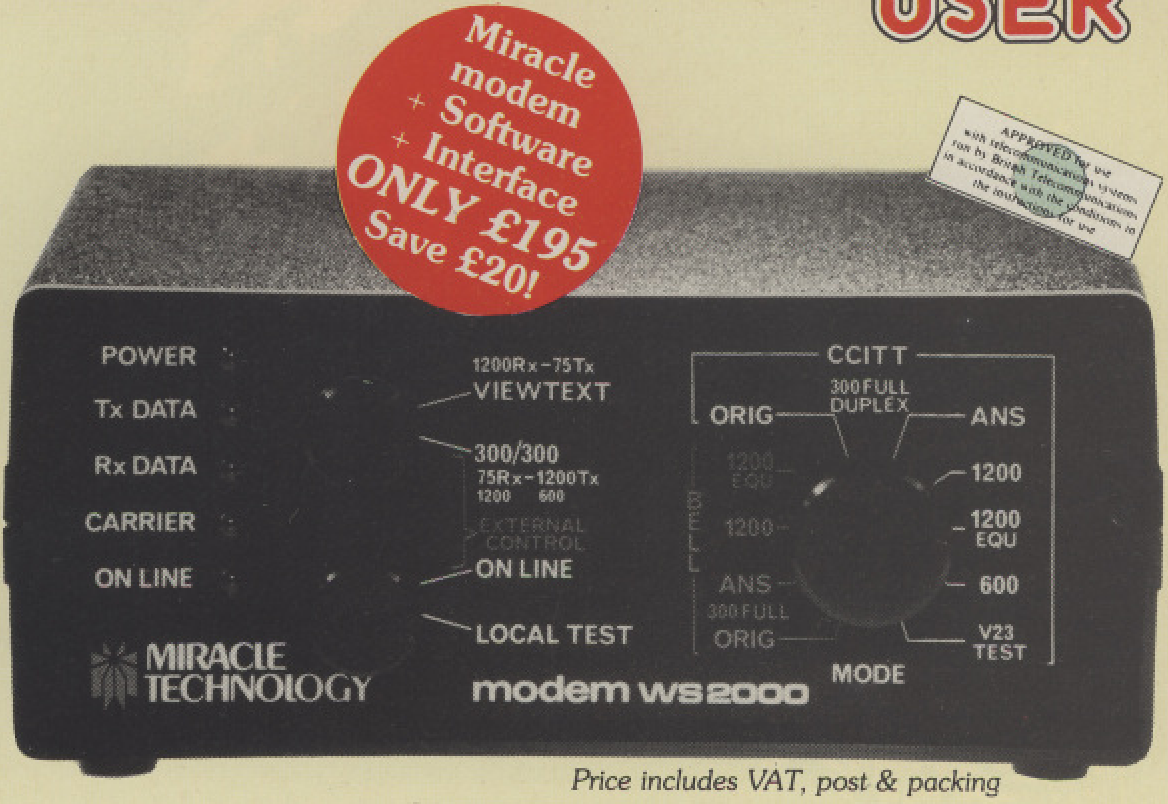
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   DPL shall issue to the subscriber such user codes (called mailbox numbers) as it thinks fit in order to allow the Subscriber and persons associated with the subscriber, access to use the Service.
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3. Charges
   a) The subscriber shall pay for all charges arising under this contract from his subscription to and/or use of the Service, and/or from the issue to him of any mailbox number issued by DPL to the Subscriber. All charges are payable on demand.
   b) DPL shall give to the Subscriber not less than fourteen days written notice of any alteration in the applicable charges for the Service. The charges applicable at the date of this Subscription are set out overleaf.
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   a) The Subscriber shall not use, or permit any person to use the Service otherwise than according to instructions given by DPL or BT, existing for the time being and in particular, shall not use the Service for the purpose of sending abusive, offensive, indecent or menacing communications, or for sending communications which cause annoyance, inconvenience, or needless anxiety.
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      iii) fail to comply with any term of this contract, or any instruction given by DPL or BT under clause 4 of this contract.
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6. Assignment
   The subscriber shall not, without the written consent of DPL assign this contract, or any rights or obligations arising under this contract.
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   c) In any event DPL's liability in contract, tort (including negligence or breach of statutory duty) or otherwise arising by reason of or in connection with this contract or howsoever otherwise shall be limited to £500,000 for any one incident or series of incidents and £1m for any series of incidents related or unrelated in any period of 12 months.
   d) DPL does not exclude or restrict its liability for death or personal injury, where such arises as a result of the negligence of DPL or its employees.
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      i) any breach by the Subscriber of his obligations hereunder;
      ii) the use of the Service by third parties by means of any mailbox number issued to the Subscriber.
   f) DPL shall not be liable for any loss or damage occurring through any act or ommission of BT or its agent Telecom Gold Limited, in the supply or failure to supply, the Service to DPL. Notwithstanding anything to the contrary contained hereby, the supply of the Dialcom service shall be upon and subject to the standard terms and conditions of BT from time to time and of which the subscriber shall be deemed to be aware.
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   h) DPL accept liability hereunder for direct loss caused to the subscriber where such loss arises solely due to acts or omissions of DPL or its employees in the provision of access to the service up to an aggregate maximum of £1,000 or a sum equal to one month's average service charges to the subscriber over the previous 12 months' period, whichever is smaller. Save as otherwise provided herein, DPL shall be under no liability for any loss suffered by the subscriber or by any other person arising from negligence or otherwise.
8. Any notice, consent or other communication required to be given hereunder by either party to the other, shall be made in writing and may be served by first class post to the address of the other as set out herein, and shall be deemed to have been received 48 hours from the time of posting.
9. This agreement constitutes the entire agreement between the Subscriber and DPL in respect of the Service, and no representation, statement, warranty or condition not expressly contained in this agreement or incorporated herein by reference, shall be binding upon DPL as a warranty or otherwise.
10. This agreement shall be governed and construed in accordance with the laws of England, and the English Courts shall have exclusive jurisdiction to determine any disputes arising hereunder.

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But first, send for the Miracle package – and enter the fascinating, limitless world of communications!

Use the order form on Page 61

HELP NEEDED ON HELP KEY CODE

IN the first issue of Atari User you explained how to disable the Break key in a Basic program.

Is it possible to disable the Reset key in the same way, so that a Basic program cannot be listed?

Next, if you PEEK(53279) you can use the Select, Option, and Start keys. I know the codes for those three, but is there one for the Help key?

Finally, I am writing a Basic program using the NOTE and POINT commands.

I know that it is possible to take one byte off a disc file and look at it.

Is it possible to then change the information in that byte and replace it in the same place in the same file without changing any of the other bytes in that file? If so, how? – **A.K. Bishop, Cheshunt, Herts.**

● Location 732 ($2DC) is updated each time the Help key is pressed. The values obtained are as follows:

17 = HELP only
81 = <Shift> HELP
145 = <Ctrl> HELP

The operating system will not clear the value for you, so it will remain in location 732 until you POKE it to zero, or the Help key is pressed in a different combination.

To change single bytes within a disc file you must first open the file for update, with:

```
10 OPEN #1,12,0,"D:
   Filename.Ext"
```

This will set up the file ready to read the first byte of data. You may now PUT or GET bytes as you wish. If you PUT bytes they will overwrite the existing data.

So if you want to read a byte then change it, NOTE the file position first, then GET the byte.

If it is a byte you wish to change, POINT yourself back again, and PUT your new data. For example, the program above will change all bytes in a file with a value of 1 to a value of 2.

```
10 OPEN #1,12,0,"D:Filename.Ext":REM O
pen file for update
20 TRAP 100:REM On End-Of-File goto li
ne 100
30 NOTE #1,A,B:REM Note position
40 GET #1,X:REM Get byte
50 IF X=1 THEN POINT #1,A,B:PUT #1,2:R
EM If byte is 1, backspace & Put 2 in
its place
60 GOTO 30:REM Get another byte
100 CLOSE #1:REM Close file
110 END
```

This method will work with DOS 2 or 3, as it uses absolute, rather than relative, addressing.

Don't try to exceed the end of the file using this method, as Append mode is the only way to do this.

For an answer to your question on Reset protection, see next month's issue, where there will be an article on protecting your Basic programs from prying eyes.

★ ★ ★

FOR the use of readers like me who prefer joysticks to keyboard control, I have changed these program lines in Attack Squash in the first issue of Atari User to:

```
1010 S=STICK(0)
1040 IF S=7 AND X<16
     THEN GOTO 1200
1050 IF S=11 AND X>1
     THEN GOTO 1250
```

Once you have changed these lines, you will find that you will be able to use a joystick. I also have a question: Is it possible to disable the Reset button, if so, is there a program or a POKE command for the XL series? I would be very grateful if you could help me. – **Tim Keats, Bracknell, Berks.**

● Yes, the Reset key can be disabled. See the reply to Mr Bishop above.

Keep your guitar in tune

I AM writing to say how pleased I am with your new magazine. It really is nice to see Atari coming back on top where it deserves.

I enclose a little program which I find quite useful when I check the pitch of my guitar from time to time, and also when I re-string it.

I am sure many readers own a guitar but perhaps do not own a tuner or pipe. This little routine does help to keep you in concert pitch.

The notes are correct on my 800XL and old 400. I don't know if all Ataris are the same, if not a slight adjustment to the data line should correct things.

Keep up the good work. – **Bruce Burke, Canterbury, Kent.**

```
10 REM Guitar Tuning Aid
20 REM by Bruce Burke
30 GRAPHICS 0
40 OPEN #1,4,0,"K"
60 PRINT :PRINT "       GUITAR TUNING A
ID"
70 PRINT :PRINT "Press any key for E,B
,G,D,A,E"
80 FOR G=1 TO 6
90 READ A
100 GET #1,DUMMY
110 SOUND 2,A,10,8
120 PRINT :PRINT "String No ";G
130 NEXT G
140 GET #1,DUMMY
150 CLOSE #1
160 RUN
170 DATA 47,63,80,107,143,191
```

Squash swap

HAVING typed the Attack Squash listing from Atari User into my 800XL I suddenly realised that there is very little that bores me more than a good game of squash, so I set about converting this program to something more interesting.

The listing below if added to the Attack Squash listing will produce a Breakout type game that I feel is perhaps a wee bit more interesting.

As in the Squash program, every time a ball is hit the bat moves up one line.

Each brick of the breakout wall must be hit twice to demolish it. First hit scores one point and the second hit scores a further two points.

There are no points awarded for hitting the ball with the bat, which means there is a maximum score of 324.

After the brick is hit for the first time it changes from a hollow rectangle to a solid rectangle, and after the second time a brick has been hit it disappears.

The bat controls are just the

→

same as in the Squash program – the left/right arrow keys move the bat left and right respectively.

The most interesting aspect of this listing, from a programming point of view, is probably the use of the LOCATE command to "see" if the ball is over a blank square, a hollow rectangle or a solid rectangle, returning a value in Z that is used to determine the score increment.

Line 655 turns a hollow rectangle into a solid rectangle and lines 561 to 565 draw the bricks that make up the breakout wall.

Lines 1671 to 1678 define the hollow rectangle brick shape and lines 3000 to 3070 increment the score as required and produce the new sound effects.

Line 230 stops the bat going higher than the breakout wall as it moves up the play area.

Lines 270 and 310 reposition the ball counter and score as now it looks prettier that way.

Line 700 stops the ball leaving the play area and line 740 finds out what the ball is laying over – Z=38 if ball lays over a hollow brick and Z=36 if ball lays over a solid brick.

Line 743 sends the program to work out the score if a brick has been hit and line 746 stops B going out of range.

Line 748 is just line 740 of the Squash program, but it was necessary to move it.

I hope you like this little addition to the Attack Squash program.

I would just like to suggest, especially now that you have published Hexer, that you include many machine code programs that are often noticeably lacking in many magazines. – **Anthony Smith, Huddersfield, West Yorkshire.**

```
230 B=7
270 POSITION 0,21
310 POSITION 9,21
561 FOR I=1 TO 6
562 FOR M=1 TO 18
563 POSITION M,I:PRINT #6;"&"
564 NEXT M
565 NEXT I
655 IF Z=38 THEN PRINT #6;"$":GOTO 670
700 IF B=2 THEN W=-W:GOSUB 2000
740 LOCATE A,B,Z
743 IF Z=36 OR Z=38 THEN GOSUB 3000
746 IF B=1 THEN W=ABS(W)
748 POSITION A,B
820 REM DELETE THIS LINE FROM SQUASH
1671 POKE CH+(ASC("&")-32)*8+0,255
1672 POKE CH+(ASC("&")-32)*8+1,255
1673 POKE CH+(ASC("&")-32)*8+2,195
1674 POKE CH+(ASC("&")-32)*8+3,195
1675 POKE CH+(ASC("&")-32)*8+4,195
1676 POKE CH+(ASC("&")-32)*8+5,195
1677 POKE CH+(ASC("&")-32)*8+6,255
1678 POKE CH+(ASC("&")-32)*8+7,255
3000 W=-W
3010 IF Z=36 THEN HT=HT+2:P=120
3020 IF Z=38 THEN HT=HT+1:P=200
3030 FOR G=1 TO 5
3040 SOUND 0,P,14,8
3050 NEXT G
3060 SOUND 0,0,0,0
3070 RETURN
```

ATARI USER Mailbag

WE welcome letters from readers – about your experiences using the Atari micros, about tips you would like to pass on to other users . . . and about what you would like to see in future issues.

The address to write to is:

Mailbag Editor
Atari User
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY

Self-test problem

COULD you please tell me if it is possible to turn off the self test program on my 600XL.

I bought an Atari game called Zaxxon, stated to be for any 16k Atari machine, but the tape aborted just as loading was finished.

I changed it, only to find it happening again. I asked the machine for the available free RAM, which was 13315.

So my conclusion is that the game being 16k and my machine being 13313 the memory wiped itself to stop overloading.

If the self test program cannot be turned off will I be able to run this tape with the aid of an expansion module?

I know the simple answer is to get a better machine, but I would like to know without the added expense. – **C. Thomas, Brighouse, West Yorks.**

● With the tape in the recorder try holding down the Start and Option keys when you turn the machine on. When you hear the buzz, press Play on the recorder and then press Return.

The lost chord . . .

I OWN an Atari 800XL and an Atari 410 recorder. All my programs load and play normally except for the Invitation to Programming series of cassettes which have a tutor's voice accompanying the lessons.

Up until a few days ago these cassettes loaded and played with no problem.

However now they load and play normally except there is no tutor's voice with any of the lessons. I would be grateful if you could give any comments as to why this should happen and any advice on how to get the tutor's voice back. – **E. Tysler, Glasgow.**

● It sounds as though the playback head on your cassette recorder might have become misaligned.

Alternatively, the channel through which the voice plays back may have stopped working.

Make sure there is no dirt on the playback head, and try adjusting it slightly. If that doesn't restore the voice have your recorder checked by your dealer.

Software protection

I HAVE just read from cover to cover the first edition of Atari User, which I found informative, well presented, of excellent typography, and extremely easy to read and comprehend.

I have one query to make. I bought the program cassette States and Capitals for use with my 800XL.

Side two (game only) loads with no trouble, but I am unable to load side one.

If I have to disconnect disc, printer, etc each time I wish to use the game it's going to be a confounded nuisance.

Is there some other way to load this side? – **Alan W. Thorpe, Southampton.**

● We're not familiar with States and Capitals, but some software protection schemes require that peripherals like disc drives and printers are switched off.

They don't have to be physically disconnected, merely not switched on. If States and Capitals is of this type there's not much you can do about it.

Faulty Frogger?

WHEN I received the June edition of Atari User and saw the listing for the game Frog Jump I typed it in.

After I had done so, I tried it and found that it kept putting "Error 5 on line 340" so I checked line 340 and found it was all right.

Then I looked at all the other lines and they also were perfectly all right.

I wondered if there was something wrong with the listing. If so could you tell me where it is wrong. – **Christopher Weathery, Ulverston, Cumbria.**

● There were no errors in the listing so you must have made a typing mistake somewhere.

Error 5 is a string length error, so make sure that you've entered the strings exactly as listed.

For example, since line 340 is mentioned, have you typed in line 130 exactly as listed? L2$ should contain only 20 characters.

★ ★ ★

I ENJOY your magazine a lot. I have just finished 'Frog Jump' in your June edition of Atari User. I typed in Run and pressed Return and it came up 'Error 13 at 1200'. I tried to solve this error, but did not succeed. I would like you to put me right. – **Sarah Shepherd, Ambergate, Derbyshire.**

● Error 13 means that the computer has encountered a NEXT statement in the program but hasn't previously seen a corresponding FOR statement. You should check that line 1170 in your program is exactly as we printed it. Make sure you've got FOR Q=0 TO 2048 here and that line 1200 has NEXT Q. With letters like Q it's easy to read them as a letter O.

Left out on cassette

I OWN an Atari 800XL and have noticed that one of my favourite games, Zaxxon, is available on 16k cassette and 32k disc.

I have a 1010 cassette deck and am therefore forced to get the 16k version, so why is the superior 32k version only on disc?



Also, Ghostbusters is here. Great, but is it available on cassette? No chance, just disc again!

Why are certain games only available on disc rather than cassette? After all, the disc drive would be put to better use in a business rather than games playing. – **Nigel Ward, Stockton-on-Tees, Cleveland.**

● The game is the same size whether it's on tape or disc. However, the disc version also needs to contain some version of DOS – see André Willey's article in this issue. Hence, if the game needs say, 15k, a disc version will need 15k plus DOS.

This might only be 20k in total, but the next size machine from a 16k one is usually 32k.

There are several reasons why a manufacturer might release a disc-only game. A tape version might take too long to load, discs are more reliable, tapes are too easy to copy.

We don't know why Ghostbusters is disc-only, but we suspect it's some combination of these reasons.

Memory boost

IS the memory on my Atari 600XL always going to be the same old 16k or is someone going to print a name and address of a shop that sells RAM packs. – **G. Thornton, Normanton, West Yorks.**

● We'll print an address – the rest is up to you. Try Silica Shop, 1-4 The Mews, Hatherley Road, Sidcup, Kent. Tel: 01-309 1111.

A change in time

I WOULD just like to thank you for bringing out a British magazine for the Atari and wish you every success in the future.

*May I suggest that in the program Reaction Timer in your first issue line 140 be changed to read 140 TIMER = (PEEK(18)*65536 + PEEK(19) *256 + PEEK(20))/50.*

I think you will find this gives a more accurate time. – **J. French, Garforth, Leeds.**

Enter the Dropzone megastars

AFTER reading the second issue of your magazine I noticed that one of your readers scored over 87,000 on the US Gold game Dropzone, so I thought you may be interested in my score on the game, which is 1,039,980.

On the high score screen is the caption "Mission completed, you are a megastar". Could you tell me if I am the first person to achieve this score?

On the subject of programming, I have included a small subroutine that may be of some interest to your readers. It plays the theme music from the film 'Close Encounters' and could be used as part of a space game.

Lastly, I hope you continue to improve your excellent magazine with more programming tips and routines on all Atari-related subjects for many years to come. – **Cameron McDade, Wakefield, West Yorks.**

● Actually, Stephen Edwards (see next letter) beat your score and wrote to us first, but you still deserve Megastar status.

Thanks for the theme music. We thought the last note sounded a bit off, but we'll leave our readers to make up their own minds about it.

★ ★ ★

AFTER buying your first two copies I was very impressed at such an informative magazine.

While reading the letters section, I read that D. Gratton from Leicester had written in and said that he had scored 89,910 on Dropzone.

I nearly laughed till I cried. My highest score to date is 1,375,550 even though you may not believe me.

It took 1¼ hours to achieve and I became a megastar and the message said that my mission was completed.

If you would like a photo for evidence I would be happy to provide one. – **Stephen Edwards, Stevenage, Herts.**

● We believe you – even without the photographic evidence!

```
99 REM CLOSE ENCOUNTERS MUSIC
100 READ A,B
110 IF A=0 THEN SOUND 0,0,0,0:SOUND 1,
0,0,0:SOUND 2,0,0,0:SOUND 3,0,0,0:GOTO
 230
120 SOUND 0,A,10,8
130 FOR D=0 TO 15:NEXT D
140 SOUND 1,A+1,10,8
150 FOR D=0 TO 15:NEXT D
160 SOUND 2,A+2,10,8
170 FOR D=0 TO 15:NEXT D
180 SOUND 3,A+3,10,8
190 FOR D=0 TO 8:NEXT D
200 GOTO 100
210 DATA 72,155,64,155,81,170,162,210,
121,280
220 DATA 0,0
230 REM REST OF PROGRAM HERE
```

FREE T-shirt for all new



Here's a really unbeatable offer for all Atari users!

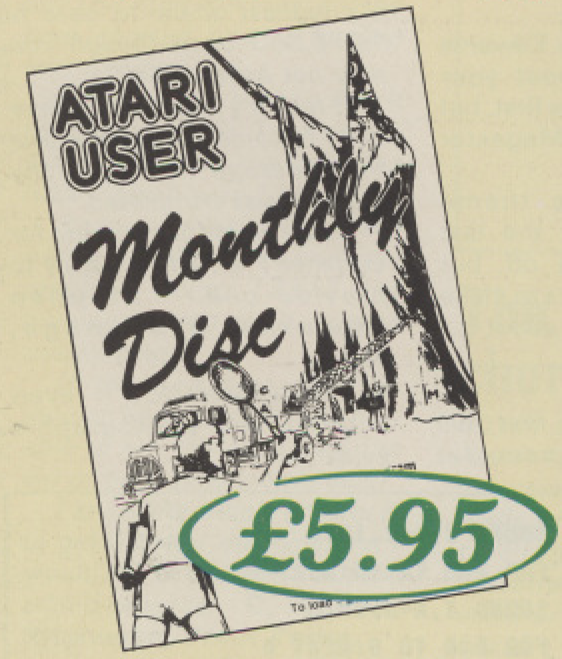
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Keying in long programs too much of a chore?



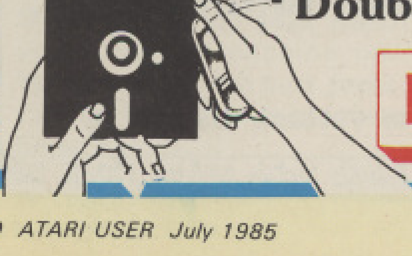
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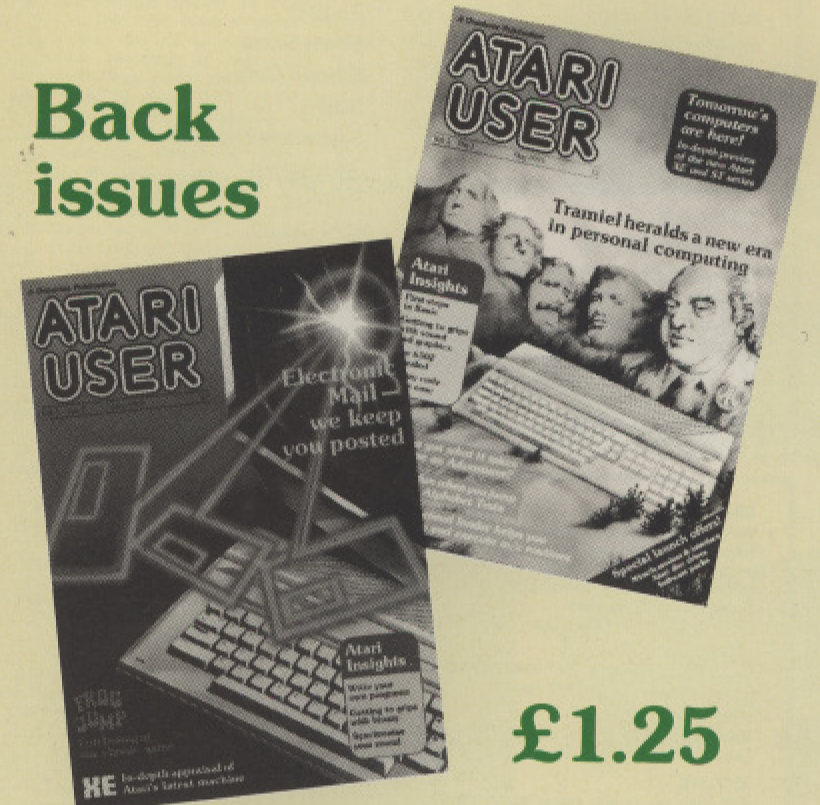
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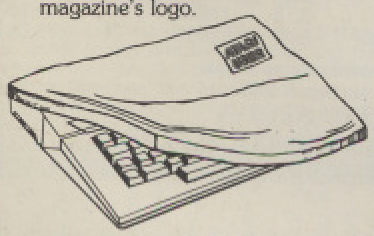


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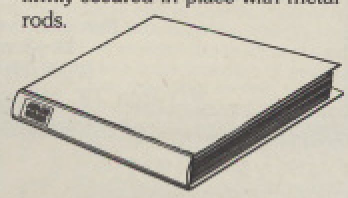
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ADVERTISERS INDEX

Anvil Software	62	Page 6	50
Ariolasoft	31, 64	Silica Shop	63
Atari	2 & 3	Silicon Chip	13
Bullock Software	16	SJB	35
Computer Support	26	Software Express	22
English Software	41	Stocksoft	62
Homeview Video	62	Sunaro	62
Llamasoft	27	S. Terrell	62
Lowmac Software	62	UK Atari Club	42
Magical Electronic Service	62	Wootton Computers	50
Microbyte	42	Zoomsoft	6
P.F. Software	38		

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